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Professional Computer System (P) Ltd (PCS)
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for the

Ministry of Information & Communications (MOIC)

Strategy Report

for

**Study on Increasing ICT Access in Rural and
Peri-urban Areas of Nepal (PS-4)**

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Acronyms and abbreviations

AEC	Agro-Enterprise Centre
AEPC	Alternative Energy Promotion Centre
AP	Access Point
APDIP	Asia-Pacific Development Information Programme
APT	Asia-Pacific Telecommunity
B2B	Business to Business
CAN	Computer Association of Nepal
CBS	Central Bureau of Statistics
CD	Compact Disc
CDMA	Code Division Multiple Access
COPPADES	Committee for the Promotion of Public Awareness and Development Studies
DANIDA	Danish International Development Agency
DDC	District Development Committee
DHQ	District Headquarters
DLGSP	Decentralised Local Governance Support Programme
DOE	Department of Education
DOH	Department of Health
DSL	Digital Subscriber Line
DVB	Digital Video Broadcast
DWSS	Department of Drinking Water Supply and Sewerage
EC	European Commission
ESAP	Energy Sector Assistance Project
ESP	Enabling State Programme
EU	European Union
FM	Frequency Modulation
FNCCI	Federation of Nepalese Chambers of Commerce and Industry
GDP	Gross Domestic Product
GIS	Geographic Information Systems
GMPCS	Global Mobile Personal Communication System
GNP	Gross National Product
GSM	Global System for Mobile Communications
HLCIT	High Level Commission for Information Technology
HMG	His Majesty's Government
ICT	Information and Communication Technology
ICT4D	Information and Communication Technology for Development
IDA	International Development Association
IDRC	International Development Research Council
IP	Internet Protocol
IPR	Intellectual Property Rights
IS	Information Systems
ISD	International Subscriber Dialling
ISP	Internet Service Provider
ISPAN	Internet Service Provider Association of Nepal
IT	Information Technology
ITPF	IT Professional Forum
JV	Joint Venture
LGP	Local Governance Programme
LSGA	Local Self Governance Act
MARTS	Multi-Access Radio Telephone System
MCT	Multipurpose Community Telecentre
MIS	Management Information System

MLD	Ministry of Local Development
MOES	Ministry of Education and Sports
MOIC	Ministry of Information and Communications
MOST	Ministry of Science and Technology
MSI	Media Services International
MW	Megawatt
MoWR	Ministry of Water Resources
NCC	National Computer Centre
NEA	Nepal Electricity Authority
NGO	Non-governmental Organisation
NITC	National Information Technology Centre
NPIX	Nepal Internet Exchange
NR	Nepalese Rupee
NT	Nepal Telecom
NTA	Nepal Telecommunications Authority
NTV	Nepal Television
ODC	Organisation Development Centre
OPGW	Over Power Ground Wire
PCS	Professional Computer System Ltd
PCO	Public Call Office
PC	Personal Computer
POP	Point of Presence
PPP	Public Private Partnership
PSTN	Public Switched Telephone Network
REDP	Rural Energy Development Program
RLU	Remote Line Unit
RMC	Rural Market Centre
RUPP	Rural-Urban Partnership Programme
SAARC	South Asian Association for Regional Co-operation
SAPAP	South Asia Poverty Alleviation Programme
SDH	Synchronous Digital Hierarchy
SECEN	Society of Electronics and Communication Engineers
SIM	Security Identity Module
SME	Small and Medium Enterprises
SPPD	Support Services Policy and Programme Development
SPV	Solar Photovoltaic
STD	Subscriber Trunk Dialling
TV	Television
UK	United Kingdom
UN	United Nations
UNDP	United Nations Development Programme
US	United States
UTL	United Telecom Ltd
UUCP	Unix-To-Unix Copy Protocol
VAT	Value Added Tax
VDC	Village Development Committee
VHF	Very High Frequency
VSAT	Very Small Aperture Terminal
WLL	Wireless Local Loop
WiFi	Wireless Fidelity
WiMAX	Worldwide Interoperability for Microwave Access

PS-4: Increasing ICT access in rural and peri-urban areas of Nepal

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1 Project status

This report has been written as part of the World Bank funded project PS-4 *Increasing ICT access in rural and peri-urban areas of Nepal*, for the Ministry of Information and Communications (MOIC). *The report is intended to stimulate discussion and comments on it are welcome: any opinions expressed are the responsibility of the consultants and do not represent MOIC's views in any way.*

Recommending a strategy is an important part of Phase 1 of this 3-phase project¹. As required by the Terms of Reference, we have already produced two background reports:

- A Sector Overview, which outlines the state of play in rural development and in the information technology, broadcasting and telecommunications sectors. It also summarises the outcome to date of efforts to provide rural telecentres. Chapter 3 below is a much shortened version of that report.
- A Review of International Experience, which summarises recent experience in the rural telecoms and ICT sector in other countries, with particular emphasis on experience which may be relevant to Nepal. Section 4.1 below reproduces key points from that report.

This, the next stage of work, is described as follows in the Terms of Reference:

Based on relevant international experience, the results of the initial field visit and existing demographic and socio-economic information, the consultants will propose viable strategic options for consideration by the government on how to increase availability of basic telephony and information services, such as Telecenters and Internet for schools, to rural and underserved urban areas. The general objective is that service provision in rural and underserved areas be commercially viable over the long term. To the extent that private investment is considered unlikely to serve all areas, the consultants shall develop a range of scenarios for targeted interventions that could potentially be financed through the Rural Telecommunications Development Fund (RTDF)...The consultant shall explore options to structure such intervention in the most appropriate way so as to leverage the maximum amount of private investment and optimise impact in providing rural service.

This report builds on:

- the Sector Overview and Review of International Experience;
- relevant recommendations of other reports which are reproduced in Annex D to Annex F;
- an Expert Workshop held in Kathmandu in November 2004 and an Open Workshop held in Kathmandu in December 2004. A full report from each workshop is available to MOIC as a separate deliverable, and main points are summarised in Section 4.3;
- further desk research, interviews with a range of key people, and discussions within the project team and between the team and MOIC.

¹ Background material on the project, including the full Terms of Reference, is available at <http://www.ruralict.ftml.net/np/nepal.htm>

Phase 2 was originally planned to consist of a demand study, and the design of a Pilot Project and Bidding Process for the Pilot Project, including the production of a Fund Operation Manual. Phase 3 was originally planned to consist of implementation of the Pilot Project, that is, the actual conduct of a competitive bidding process and award to successful bidders of any necessary subsidies and licences. Some changes to the plan may be necessary in the light of changing circumstances in Nepal.

2 Executive summary

For the purpose of this study, Information and Communication Technology (ICT) is broadly interpreted to mean any electronic technology that can support information and communications. This includes not only fixed and mobile telephony and Internet, but also radio and television broadcasting, and stand-alone computers and other non-networked equipment such as audio and video recorders.

The underlying purpose of this project is to work towards the reduction of poverty, in keeping with HMG's Tenth Plan (which is a Poverty Reduction Strategy) and the Millennium Development Goals. Our recommendations will therefore aim to serve poor people generally, and especially Nepal's poorest and most oppressed groups: Dalits and women.

The following proposed principle appears to us to be a sound one:

“Public interest” investments in ICTs in developing countries should be designed so that not less than half of the invested funds go into projects whose results can be used by the entire population, independent of education and income level².

Given the rural focus of our project and the extreme poverty of rural Nepal, we suggest that in this case the figure should be more than half – say, three-quarters. This means focusing on technologies whose use does not require special training, in particular telephones (both fixed and mobile) and broadcasting.

The following cornerstones of our proposed strategy have now been firmly established, following widespread discussion, including both workshops.

- Planning for ICTs must be integrated into overall planning for development.
- The basic approach is to be demand-driven and community-based in providing ICT access, starting with a major drive towards improving people's awareness of the potential of ICTs.
- A variety of different community development paths using ICTs will be illustrated, in the hope of fitting the variety of different conditions in rural Nepal.
- The focus for action will be at the local level, using small entrepreneurs and NGOs in partnership.
- We believe that providing computers in secondary schools is a cost-effective way of stimulating demand for Internet (along with achieving other useful purposes), and we propose a realistic, if stretching, programme to do this.

² This principle relates to use of invested funds, not to the proportion of total funds which can be invested (after deduction of administration costs).

- A range of central actions are vital to support community-based efforts and to implement the fully liberalised environment needed for enterprise to flourish. Some of these are proper to MOIC/NTA, but all Government Departments will need to play their parts, including support of applications and content.

Our proposed approach to extending network infrastructure has been developed since the workshops:

- Since Nepal Telecom (NT) now has firm plans for a wide roll-out of phone lines within the next two years, and there are no immediate prospects for new major competitors, we propose that public policy should focus on "filling the gaps" in NT's plans.
- We propose ambitious goals for widespread availability of telephone service by 2010 (in terms of lines on demand almost everywhere, and public call offices (PCOs) in all settlements over a certain size), with the aim of fulfilling the Telecom Policy objective of "phones within shouting distance" for the highest possible percentage of the population. The major likely obstacle to achieving these goals is the security situation.
- We propose markedly more modest goals for universal access to Internet by 2010, in terms of public access points in a number of rural market centres per District, with the aim of providing "Internet within walking distance" for a large percentage of the population. In common with other ICT activities, this programme will be more cost-effective if co-ordinated with the provision of electricity supply, and we recommend that this be done wherever possible.

Work is still in progress on quantifying the subsidies which may be needed to achieve each goal, and on sizing an appropriate pilot project and roll-out programme. Initial indications point to a total subsidy programme of some \$10m over 5 years, of which up to \$5m could be spent on extending telephone infrastructure to remote settlements, up to \$1m on public Internet access points in Rural Market Centres, and up to \$4m on a variety of community-based access projects and content and applications development.

A new semi-autonomous body (tentatively named NTAR) will be set up to manage the subsidy programme, initially under NTA, working closely with other interested bodies. We expect that the size of the activity programme that can be managed is more likely to be limited by the capacity of NTAR than by the availability of funds, especially in the early years. Once NTAR has proved its competence, it should be relatively easy to attract donor funding for ICT projects.

There is potential for rural ICT access to contribute significantly to almost all areas of development, including of course progress towards the Millennium Development Goals. Three areas where ICT access can be particularly valuable are education, health and agricultural information. The initial proposals in this report include support for computers and Internet in secondary schools. Other programmes in all three areas will need to be set up over the next few years, with participation from both NTAR and the relevant Ministries.

In devising the network infrastructure strategy we have tried to meet the following objectives:

- Ensuring that NT fulfils its roll-out plans
- Fostering competition to NT in rural areas

- Ensuring viability of small competitors
- Getting value for money from subsidies.

Achieving any one of these is a challenge. Achieving elements of all four will be a continuing balancing act, requiring periodic review and adaptation to changing circumstances. In particular, though it is agreed that all comers should be allowed to operate in rural markets, it is not yet clear how far public policy should seek to fund network build beyond NT's roll-out plans.

3 Summary of sector overview

3.1 Rural environment

3.1.1 Terrain and population distribution

The southernmost belt of Tarai low land lies below 300 metres in altitude, the mid hilly region from 300 metres to 3000 metres, and the high alpine Himalayan region is above 3000 metres in altitude. Seventeen Districts are classified as Mountain Districts even if river valleys have altitudes as low as 1000 metres.

Nepal's population is 23.15 million³. Of these, 1.69 million live in the 17 mountainous districts, 10.25 million in the hilly districts and the rest, 11.21 million, in the tarai. 85.8% of the people live in areas classified as rural. Density of population varies according to terrain as well as the regions (see Figure 1). The literacy rate among people of 6 years or older in Nepal is 54 percent overall, 65 percent among males and 43 percent among females.

Figure 1: Population density in different parts of Nepal

People per sq km	Mountain	Hill	Terai
Eastern	38	153	454
Central	88	300	422
Western	4	152	333
Mid-Western	14	107	168
Far-Western	50	118	205
Average	33	167	330

3.1.2 Ethnicity, language and religion

Nepal is a multi-ethnic, multi-lingual and multi-religious society. The major caste/ethnic groups are Chhetri (15.8%), Brahmin Hill (12.7%), Magar (7.1%), Tharu (6.8%), Tamang (5.6%), Newar (5.5%), Muslim (4.3%), Kami (3.9%), Rai (3.9%), Gurung (2.8%), Damai/Dholi (2.4%). Other caste and ethnic groups each constitute less than 2 percent of the population.

49 percent of the total population has Nepali as their mother tongue, followed by Maithili (12%). Other main languages are Bhojpuri, Tharu, Tamang, Newari, Magar, Rai and Abadhi. The following languages are spoken by less than one percent of the population: Santhal (0.18%), Thakali (0.03%), Danuwar (0.14%).

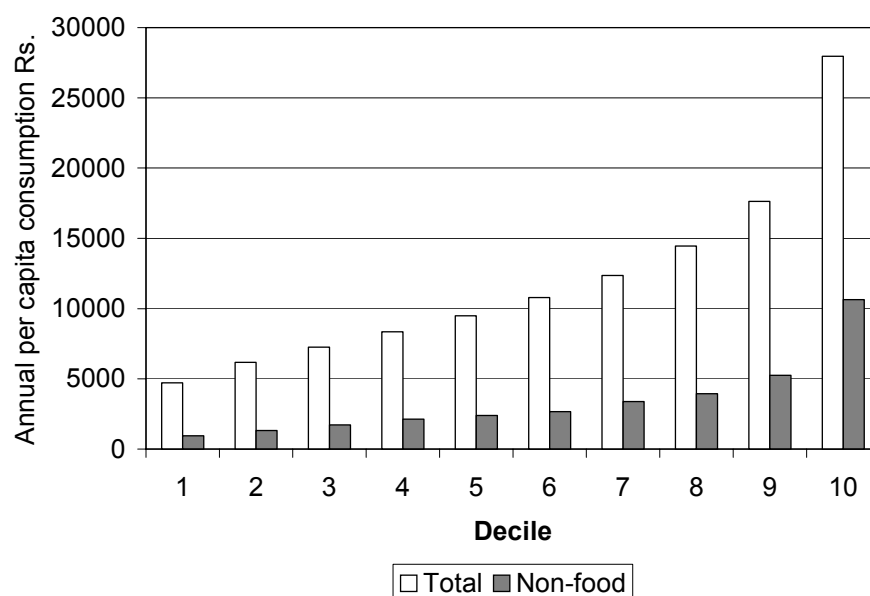
³ Unless otherwise stated, all statistics are supplied by the Central Bureau of Statistics, and are the latest available (in most cases, from Census 2001).

By religion, Hindus are 81%, Buddhists 11% and Muslims 4%. Kirat religion accounts for nearly 3.6 percent of the population. Certain animistic practices of old indigenous religions survive.

3.1.3 Rural economic situation

Nepal ranks among the world's poorest countries with a per capita income of \$240 and 38% of the population is below the poverty line⁴. About 80% of households are classified as “agricultural”⁵, with agriculture holding 39% of the total GNP of the country. The top 8% of households own 31% of agricultural land, and the bottom 17% own 2%⁶.

Figure 2: Average annual consumption by decile, Rural Nepal⁷



The total consumption of the highest decile is six times as much as the consumption of the lowest decile, and eleven times for non-food items. The poorest have to use a higher share for food. All non-food items are purchased or bartered, not own account production.

3.1.4 Rural development: institutional structure and plans

There are 5 Regional administrations, 75 district development committees (DDC), and 3,914 village development committees (VDC). Devolution and decentralisation of central government authority to lower levels of government has started. Local self governance institutions are DDCs and VDCs in rural areas, Municipalities in urban areas, and Ward Committees (Wards) of VDCs and Municipalities, with locally elected members. Under the Local Self Governance Act (LSGA), these bodies have been given substantial powers to manage local development.

⁴ Annex G on Millennium Development Goals provides further such statistics and their sources.

⁵ Nepal Living Standards Survey 2, December 2004.

⁶ Nepal Living Standards Survey 2, December 2004.

⁷ Source: Nepal Living Standards Survey 1, 1995-6. The recently published Nepal Living Standards Survey 2 shows an even greater discrepancy between the lowest and highest deciles.

The Ilaka level, intermediate between Districts and VDCs, has no formal administrative role but does have a potential service centre function. Banks, health facilities, post office, schools, and small markets all seem to congregate in close proximity, forming a growth centre for public services. These centres were targeted to have health posts, Ilaka post offices, Agriculture and Live Stock service centres. Ilakas also generally have commercial operations requiring modern communications facilities.

Participatory planning and implementation of projects has grown gradually from a few districts to its present level of 60 districts and 662 VDCs. Now these programmes are grouped under one name, Decentralised Local Governance Support Programme (DLGSP), and programmes are running to develop these institutions in the country within a proper legal framework. The Programme will include all 75 districts and 1000 VDCs by the year 2004/2005.

Development Plans (2002-2007) include several institutional and infrastructure projects to be implemented at the local level. Following is a basic outline of these programmes:

Periodic plans of all districts and municipalities will be prepared and implemented.

- Information centres (including Geographical Information System, GIS) will be set up and strengthened at all DDCs and municipalities. Information systems will gradually be set up and operated at VDCs too. Poverty mapping will be implemented in selected districts.
- District Transport Master Plans will be prepared in all districts.
- Local Development Funds will be set up at local bodies (DDCs, VDCs and municipalities).
- Several roads, trails, bridges and electricity and water supply and sanitation schemes.
- Electricity development (including both national grid and small local schemes) aims at electrifying 43%, 60%, and 80% of the nation's households respectively by the end of years 2007, 2017 and 2027. Figure 3 from the recent Nepal Living Standards Survey 2 shows 37% of households having electricity in 2003-4, but only 27% of rural households.

Figure 3: Percentage of households with electricity and own telephone

	Electricity %	Telephone %
Development Region		
East	29.0	4.0
Central	46.1	11.1
West	48.3	4.2
Mid West	21.6	1.3
Far West	14.2	2.0
Ecological Zone		
Mountains	14.8	0.0
Hills	41.9	9.5
Tarai	36.2	3.8
Urban	87.4	31.9
Kathmandu Valley	99.1	51.3

Other	80.9	21.2
Rural	27.3	1.1
East Mts./Hills	25.3	2.5
West Mts./Hills	26.2	0.3
East Tarai	27.4	0.5
West Tarai	32.0	1.1
Consumption quintiles		
Poorest	10.3	0.0
Second	16.5	0.1
Third	24.6	0.2
Fourth	40.2	1.7
Richest	77.5	23.3
Nepal	37.2	6.1

3.1.5 *Service infrastructure*

The Postal system has a District Post Office in each district, 842 Ilaka Post Offices and 3074 Additional post offices, one per VDC. Similarly, there are 9 Zonal Hospitals, 71 district hospitals, and 205 Primary Health Care Centres, and 675 Ilaka Health Posts consisting of at least one doctor. Every VDC has a Sub Health Post and has a Village Health Worker and Maternity Care Health Worker. One Female Community Health Volunteer is assigned to every ward.

There are 25,927 primary schools (grades 1-5), 7,289 lower secondary schools (grades 6-8) and 4,350 secondary schools (grades 9-10) with 3.6 million, 960 thousand, and 370 thousand students in each category respectively.

3.2 **Information Technology sector**

IT in Nepal is a young sector. For the first time in Nepal, Central Bureau of Statistics (CBS) used an IBM 1401 for processing the 1971 population census. A number of Ministries and government departments have websites now. But quite a few of them have still to establish these and most of the websites seem to suffer from insufficient and out-of-date information. The industry also lacks web presence. E-mail is not used in government transactions, though it finds application in dealing with the private sector.

Government brought out IT Policy 2000 to provide strategic direction and help formulate appropriate policy responses for the development of ICT sector in the country, for harnessing these technologies to meet key developmental challenges, including governance reform, and catalyzing economic growth for poverty reduction. The High Level IT Commission and National IT Centre have been set up to facilitate the development of the information technology sector. Electronic Transaction and Digital Signature Ordinance has recently been promulgated. The government has already prepared the necessary draft regulation for effective implementation of the ordinance.

Nearly all central Government Departments by now have adopted some IT systems. However, the type and status of these varies greatly. Presently all 12 partner municipalities of Rural Urban Partnership Programme (RUPP) are disseminating daily agro-market prices through the use of email, telephone, fax and price bulletin boards in different market places. RUPP in collaboration with AEC/FNCCI has successfully hosted the Agro-Price web site.

RUPP has also initiated the idea of implementing e-governance with the eye on improving administration process (e-administration), connecting citizens (e-citizens, e-services) and building external interactions (e-societies) and improved urban service delivery for public in a number of Municipalities.

Four Nepalese universities are offering IT related academic course with annual intake of about 5000 students. Courses at all levels (undergraduate, postgraduate and doctorate) are being offered. The number of colleges offering IT courses and their capacity was growing every year but is beginning to slow down because fewer jobs are available within the country. There are also a number of colleges opened with affiliation from foreign universities offering IT courses.

3.3 Broadcasting sector

3.3.1 Broadcast Radio

Radio Nepal, established in 1951, currently airs programmes on Short Wave, Medium Wave and FM frequencies. Regular broadcasts cover a duration of 16 hours every day, which includes 2 hours of regional broadcasts. Its medium wave broadcasts reach about 60% of the population and its policy is to expand the medium wave service to cover the entire population.

In 1997 the government issued a license to the first private group, Radio Sagarmatha. The programmes of Radio Sagarmatha are of a public service nature. There are now 24 private radio stations already in operation. Most of the stations operating are commercial stations whose programmes include mostly music, information, quiz and phone-ins. Pokhara has four commercial stations.

The number of licensees are 56 including Radio Nepal, out which 46 are operational. 36 of these stations are commercial whereas 16 are Community Radios (CR). Regionwise, licensed stations are 8 in the Eastern, 22 in the Central, 16 in the Western, 8 in the Mid-West and 2 in the Far Western Development Region. The number of Districts with FM stations is 21.

From the ownership point of view, the majority of CR are owned by NGOs and cooperatives. Areas served by CR of Madan Pokhara (CRM) have focussed on 23 VDCs and one municipality but service extends to 65 VDCs. Estimated listeners of CRM are about 500,000. People's participation is extensive in CRM. It has a General Assembly comprising: representatives of listeners, Community and grassroots organizations, professional organizations, friends of CRM, life-members, Intellectuals. Its Board of Advisors includes expertise and visionaries of community communication, government officers related to communication, people's elected representatives and political parties. The Management Board comprises Lifelong members and members elected by the General Assembly and belonging to the General Assembly. The income of CRM comes from fees from life members and general members, contributions from visitors of radio station, local advertisements, and local governments and VDCs, including charity such as handfuls of rice or equivalent daily savings from listeners through Listeners' Clubs. Community Forest Users Groups contribute a portion of their income and some programmes are sponsored by Development Organisations.

Problems of Community Radios are basically lack of clear policy on Community media and use of air-waves. The policy and regulations must be specific on regulations of air-waves, on differentiating Community Radio from Commercial Radio, on distinguishing the role of National and Local Broadcasting and Public Service Broadcasting and Commercial Broadcasting. Non-transparent administration and high license and renewal fees are real headaches. Right choice of technology and adequate skills are very much needed in building CRs.

3.3.2 Television

Nepal TV (NTV) started as a project in January 1985. When it went on air with its thirty minutes transmission, the number of TV sets increased dramatically. It started its regular transmission of two hours towards the end of 1985. In February of 1986, it became a full fledged Corporation under the Communication Act, established as an electronic medium to enhance the country's socio-economic development. NTV currently covers 42% of the country's population and 32% of the land area. Transmission hours have also increased to 61 hours per week. NTV has a Metro Channel and is also operating through Satellite for expanding television coverage throughout the country.

Space Time Network, a private cable TV service provider, launched its commercial satellite channel, Channel Nepal, in July 2001. Other more recent private operators who are licensed to broadcast through satellite are Ad-Avenue and Shangri-La Channel. Image Metro, Kantipur Television, is the terrestrial TV operating in the private sector.

There were 257 licensed cable TV operators in Nepal by 2003. It has been estimated that nearly twice as many do not possess a licence. These operators provide service mainly in urban areas and in electrified rural areas. Some operators produce and disseminate their own local programmes through their cable networks. These programmes are popularly known as local TV. Local people watch them with great enthusiasm and interest.

3.3.3 Availability of radio and TV sets

Numbers of households owning radio and TV sets in accordance with the Census of 2001 are given in the following Figure. About 51% of rural households owned radio and 16% TV receivers. Radio and TV ownership in mountain area is 54% and 5% whereas in Tarai the figures are 43 and 25 percent of households respectively.

Figure 4: Ownership of TV & Radio Receivers

	Neither TV nor radio	TV Only	Radio Only	TV & Radio both	Total Radio	Total TV
Area	% of households					
Nepal	41	6	36	17	53	23
Urban	24	11	21	44	65	55
Rural	44	5	39	12	51	16
Mountain	45	1	50	4	54	5
Hills	32	3	46	19	65	23
Tarai	49	9	26	16	43	25

3.3.4 Broadcasting Policy and Regulatory Framework

The Communication Policy of 1992 was the first policy document covering all the components of communications. It paved the way for introducing laws and regulations for private sector participation in broadcasting in a democratic environment. Communication Policy 2000 also promotes private sector in broadcasting.

Radio Act (1957) was designed to license for holding, making or using radio machines (equipment). Broadcasting Act (1993), which followed the 1992 Communications Policy, had set the stage for breaking the hold of state owned monopoly of Radio Nepal and Nepal Television in broadcasting. National Broadcasting Regulation came two years after the Act, covering licensing procedures, annual licensing and royalty charges. The rules stipulate that the period of the license will be specified in the permission letter. The regulation reserves the right to issue a license or not to without specifying any criteria as to how an applicant is qualified or otherwise to obtain a license. Rules are not specific in terms of any period within which a license will be issued or an application will be rejected showing reasons of rejection. Rules further specify that license period will be as mentioned in the license, with the permission letter indicating that the period is subject to the discretion of the licensing authority.

3.4 Telecommunications sector

3.4.1 Sector structure

In major services, currently we have 4 operators licensed to provide services. These are:

- Nepal Telecom, the incumbent, who is operating nationwide and has a full range of telecom services including cellular mobile,
- United Telecom Limited (UTL) is operating wireless in local loop systems since 2003, to date only in the Kathmandu Valley,
- STM Communications Ltd is installing and operating telecom services through VSAT systems in the rural areas of the Eastern Development Region since 2004, and
- Spice Nepal, the new cellular mobile operator, was licensed in 2004 and has recently announced plans to launch GSM service in April 2005.

In 1999 NTA opened Minor Services for licensing by Gazette notification as stipulated under section 23 subsection (2) of the Act. Operators under this provision are allowed to apply at any time for a license. To date 26 licenses have been issued to Internet service, 8 to radio paging, 10 to VSAT service providers and 6 to fax mail service providers. Two licenses for GMPCS were issued during the year 2003/2004.

3.4.2 Telecommunication Network

3.4.2.1 Existing and planned backbone and spur routes

Nepal Telecom is well on the way to completing a full national transmission backbone which will cover all Districts, including Internet capability to all District Headquarters towns:

- Earlier, mainly microwave radio relay systems existed, with recently established fibre backbone along 2/3 length of the East-West Highway.

- Kathmandu-Pokhara-Butwal and Kathmandu-Hetauda Over Power Ground Wire (OPGW) fibre is now operational, and on the route Kathmandu-Ramechhap-Bardibas (near Janakpur), OPGW fibre is under construction by Nepal Electricity Authority (NEA).
- SDH radio links are planned to replace microwave backbone routes east of Kathmandu by July 2006, and in the western part by July 2007. About 100 hops of microwave radio spur links of 8-34 Mb/s are planned to be installed by July 2006.
- Regional satellite links providing 150 voice circuits each between Kathmandu, and regional towns Nepalgunj, Bhairahawa, and Pokhara are operational now. A 120 voice circuit satellite link is also being planned between Kathmandu and Dhangadhi.
- District satellite links are planned by 2006 to provide 60 low bit rate (8 kbps) voice channels for connecting over 300 CDMA subscribers in each of 30 sites, including at least one in each of the 20 remote Districts not reached by terrestrial transmission links. A 128 kbps DVB down link and 64 kbps up link will be provided for Internet services per District Headquarters terminal.

3.4.2.2 Existing and planned telephone and mobile services

The existing picture is one of very low rural teledensity, made worse by the prevailing conflict:

- Nepal Telecom provides fixed telephone service through 412,000 connected lines out of 482,000 installed lines, from 187 telephone exchanges in 181 locations, in 69 out of 75 districts of the country.
- Starting from 1999, by July 2004 NT's post-paid mobile subscribers were 70,360 and prepaid subscribers were 120,000. In October, about 58,000 new connections sold out in 2 days. The area covered is nearly all towns, and in the near future adjoining towns along the highway from Kathmandu to Bhadrapur in the east and main towns and cities in the west.
- UTL has about 35,000 connections in operation only in Kathmandu.
- Average penetration of fixed lines for the whole country is 1.8 lines per hundred persons whereas for rural it is only 1.2 lines per thousand persons (before taking account of reductions because of the conflict).
- Rural telephone service is provided through small exchanges in rural commercial centres and through Multi-Access Radio Telephone Technology (MARTS), VHF subscriber equipment or through VSAT terminals for remote locations.
- According to Nepal Telecom's July 2004 figures there are 539 MARTS terminals and 92 repeaters, 186 VSAT terminals, and a number of VHF single or two channel telephones which provide altogether 3957 rural lines. However, many of these MARTS and VHF systems including some rural exchanges are not operational due to the prevailing conflict. NT estimates that telephone service in 23 Districts, 15 of them remote mountainous Districts, has been severely affected in this way.
- The VSAT installation programme has been scaled down due to problems in equipment as well as due to the prevailing conflict. WLL (Correct) equipment, which was being piloted in Western Development Region, has been abandoned for further

deployment due to some equipment design deficiencies which led to unreliable service in the Nepalese environment.

- Significant improvements in rural service provision are now under way:
- Most importantly, NT has a CDMA contract to provide up to 1m urban and rural subscriber connections by July 2007. The equipment can provide full mobility, as and when it is decided to operate in this way, but several connections will remain fixed to take advantage of the longer range within which fixed connections can function. This first phase will include at least one base station in each District, each equipped to serve about 500 subscriber lines. The coverage area of a base station will vary according to topography, but is nominally 25 km in radius. The CDMA networks are proposed to be extended by 500,000 subscribers after July 2007.
- STM Communications Ltd., the Eastern Development Region's rural operator, has initiated service in 107 locations, mainly in Tarai area, out of the total of 1068 locations to be served. The service of STM is not being welcomed by all people, due to its higher tariff.
- A bid evaluation for NT GSM equipment for 1 million connections is currently in progress. The first phase is to add 750,000 new connections, of which 150,000 are for post-paid and 600,000 for prepaid, to be completed within 18 months of contract. Plans focus on lower lying areas. The second phase of 250,000 connections, while not included in the roll out schedule, will be scheduled later as required by demand.
- Spice Nepal has a roll out plan to commence service in Kathmandu Valley by June 2005 and to add 4/5 major towns in 3 years.

3.4.3 Telecom policy and regulatory framework

The Telecommunication Act 1997 led to the establishment of Nepal Telecommunication Authority (NTA) in 1998 to regulate the telecom sector. Telecommunication Regulations were first published in 1997. The specific Telecom Policy 1999 for the first time stated that services would be operated by several operators by 2004.

The Telecommunications Policy 2004 intends to liberalise the sector by introducing an open licensing regime with simplified procedure for license fees, specific principles of interconnection and measures against anticompetitive behaviour of incumbent. It also redefines universal access as "phones within shouting distance", and emphasises a number of steps to be taken to promote application of ICT in the country.

3.4.4 Implementation of Telecom Policy 2004

Due to uncertainties as to when the amendment of Act and regulations will materialise, it appears wise that existing provisions of the Act be utilized as far as possible to implement the policy to avoid further delay. Liberalisation of the sector, particularly in provision of connectivity to offer Internet and Voice over IP to rural users by other operators, including small local ones as envisaged in Telecom Policy 2004, is not going to be possible unless Policy 2004 gets implemented. *Section 23 subsection (2) of the Act permits Government to call applications for license through a Gazette notification specifying all the rules and procedures in the notification itself. In order to implement Telecom Policy 2004, all services requiring a standard license can be brought under this subsection.*

The Telecom Regulation (1997) can be amended through Cabinet decision. Individual licenses can also be executed before the Act is amended by the same type of Gazette Notification. License fees can also be set according to the new Policy by amending the regulations. Changing regulations is a far simpler process than amending the Act. Therefore, these steps should be taken immediately, to prepare for implementation of infrastructure provisions for ICT projects by smaller operators in peri-urban and rural areas.

3.5 Internet

3.5.1 Internet services growth in Nepal

Dial-up email service via UUCP started in 1994. By January 2000 there were 9 ISPs operational. This number has grown to 26 ISP licensees by July 2004.. The number of Internet accounts in 2004 is estimated at about *50 thousand which grew from a figure of 9 thousand in 2000*⁸. Based on the figure of accounts, the number of users is estimated at 200 thousand. International bandwidth for Internet connection in total is estimated at about 45 mbps. Internet growth outside Kathmandu Valley has been slow and about 80% of users are in Kathmandu.

A major factor limiting Internet demand outside main centres is high access cost. Only in the second half of 2004 has Nepal Telecom been able to establish dial-up access at a local fee in 55 district headquarters through their POPs or virtual POPs. And this facility is only available to the customers of Nepal Telecom's own ISP. The growth has been impeded due to following problems as well.

- *Long distance leased lines are not readily available and quality of service is poor.*
- *Leased line costs are high and are currently not regulated by NTA.*
- *Backhaul costs for international links are also high compared with Kathmandu because of loss of economies of scale, with fewer customers and lower bandwidth use.*
- *ISPs suffer regulatory inconveniences while obtaining services from regulatory functionaries.*
- *ISPs also have to bear full regulatory fees, universal access obligation and Royalty charges.*

3.5.2 Nepal Internet Exchange and IP backbone

Nepal Internet Exchange (NPIX) was established in 2002. NPIX at present carries traffic of only about 2 Mbps. The goals of NPIX are:

- faster exchange of data between users of local ISPs.
- saving money on expensive international bandwidth for traffic originated and terminated within Nepal.
- to propagate new services through NPIX like web hosting, telephony, ecommerce and portals.

Currently several ISPs including Worldlink, MOS and Vianet are peering in NPIX. More than half the ISPs have yet to connect to this exchange. The time has come to expand NPIX further, and develop regional exchanges to permit ISPs to exchange traffic outside Kathmandu.

⁸ There are no formal statistics as to accounts, but this estimate was given during a meeting with the ISPs.

3.5.3 Cost factors for users and necessary regulatory oversight

Even after cheaper bandwidth prices resulting from deregulation of international data links, the bandwidth component still constitutes about 40% of what ISPs collect from the user, due to Nepal's dependence on satellite media in this regard. The other large cost component (about 40%) for the average user is telephone usage for dial-up connection. Although a user uses his telephone for much longer periods for Internet service than for normal voice calls, he still does not enjoy cheaper rates for long use and is charged at the rate of a normal telephone call.

To encourage growth in Internet use, Nepal needs to follow the example of many other countries and provide discounted and flat rates for Internet dial-up service. But in the absence of competition in dial-up service for Internet⁹, *Internet users are not likely to obtain cheaper access without regulatory intervention.*

Similarly in absence of regulation of DSL service, Nepal Telecom is likely to use its monopoly strength to charge whatever they want if they do provide DSL modems. Cable operators have been permitted to provide cable modem service, but as they too are trying to be ISPs, they too are likely to use their monopoly powers to move Internet users to their fold by bundling Internet and television charges together. It may be wise for NTA to require unbundling of both DSL provision and cable modem provision.

3.5.4 Cyber cafes

There has been a significant upsurge in the number (estimated to be over 1000) of privately owned internet kiosks (popularly known as *cyber cafes*) in several urban areas of Nepal where basic enabling infrastructure exists. These provide Internet and email services and also other communications and telephone calling facilities. Cyber cafes are an important means for accessing the Internet, particularly for the younger generation who do not have access in their homes. These cyber cafes or *kiosks* are playing a crucial role in diffusing ICTs to a large number of people. Chat seems to be the most popular method of communicating between youngsters.

A forthcoming report on the future of NepalNet subject by ODC (commissioned by IDRC) interviewed over 1,000 individual users of cyber cafes in nine main cities of Nepal. Cyber cafe users were predominantly young and well-educated: their average age was 22 years, and more than 90% had at least Higher Secondary education. 70% of interviewees described themselves as students. The most popular use of Internet search was entertainment (33%), closely followed by news and research. The most used Nepali website by far was nepalnews.com (48%).

3.5.5 Technical bottlenecks for rural Internet provision

In summary, rural telecom service is being provided through direct exchange lines of rural switches such as the C-DOT type, RLUs (remote line units) of bigger digital switches, exchange lines extended by MARTS or through VSAT terminals, cellular GSM system, and CDMA system. Nepal Telecom is planning to serve a large part of the country with CDMA.

⁹ UTL's dial-up WLL service, while directly Internet-compatible (not requiring a modem) has the inherently lower speed of 14.4 kbps.

The following technical problems exist in the rural telecom network for providing Internet service:

- The VSAT system provided by Nepal Telecom and STM has voice based systems and uses a low rate codec. As such they provide data at very low rates (below 8 kbps), which is inadequate for functional Internet access.
- The rural exchange of C-DOT type is not able to provide Internet connections.
- Present CDMA and GSM equipment also have speed limitations on their codecs and as such cannot be used beyond 8 kbps.

However, Nepal Telecom says that 55 district headquarters do not have limitations as they are not connected to C-DOT type rural digital switch. At the same time Nepal Telecom is providing 20 difficult district headquarters with 128 kbps DVB mode of satellite down link for data at each district headquarters with the purpose of providing Internet connections. Therefore all district headquarters will have good internet down link capability. Going down beyond DHQs, it seems that the problem persists unless those rural areas are connected with the district headquarters. It is now clarified by NT that CDMA network can also provide Internet access in the rest of proposed network through their PSDN switch proposed to be installed in Kathmandu.

3.5.6 Potential for WiFi to provide Rural Internet Access

Within a district, a network for data as well as for telephones can be built on WiFi-like technology, or WiMAX, which is going to come in the market towards the end of 2005. WiFi has the advantage of being a WLAN 802.11 b/g/a standard, which is very popular, and is finding widespread use with a fairly large number of suppliers. WiFi is the technology which uses ISM (Industrial Scientific and Medical) bands which are license-free in many countries. In Nepal it is used in much longer hops to get coverage of wireless customers which are much more widely dispersed, even in places like the capital city. These bands are not yet made license-free in Nepal. These bands could easily be left license-free, particularly in peri-urban and rural applications. WiMAX is a new technology standard, 802.16, and is touted to be really advantageous for rural coverage. Once they are deployed in large numbers prices will fall. *The regulatory arrangements for co-location of private sector equipment and antennas with that of the incumbent operator could greatly enhance the capability of small private operators to provide IP connections in rural areas.*

3.6 Rural ICT interventions

At least 36 pilot rural telecentres have been set up in recent years by UNDP, RUPP, and HLCIT among others. Our survey found only a few actually operational, and some of these in off-line mode only. On the positive side, there is a great deal of enthusiasm to support and promote telecentres at the community level. But three sets of lessons must be absorbed if future telecentres are to succeed:

- Fulfilment of certain basic preconditions, without which a telecentre is doomed to fail, including reasonable speed connectivity, affordable access prices and security for staff.
- Community involvement, which is the essential foundation for local support and use of a telecentre.
- Central support, providing services needed by all telecentres, such as relevant content.

There is also good deal of other relevant activity going on, with very little co-ordination. For example:

- HealthNet Nepal is running a telemedicine pilot in three Districts.
- The Nepal Wireless project is providing Internet access to several remote villages in Myagdi District.
- The NGO COPPADES has already provided computers to 75 rural schools and is working to extend this programme to many more schools in 2005.

3.7 Summary of key points arising from sector overview

Figure 5 shows how long it takes people in different parts of Nepal to reach their nearest phone booth. It underlines the sharp division in this respect between urban and rural Nepal, and between ecological zones – with the mountains being far worse than the hills, which in turn are worse than the Terai.

Figure 6 provides some high-level demographic data and summary information on telecoms provision in the Districts falling into the major subdivisions of Nepal: the five Development Regions and the three major types of terrain, with the Kathmandu Valley separately identified. It is important to note that the fixed line data are more than a year old. In the intervening year, many rural telecoms facilities have been lost because of the conflict, so the picture is now rather worse. The two right-hand columns refer to Internet and cellular mobile service being available in District Headquarters (DHQ) towns only.

We see that teledensity is very low throughout rural Nepal, but the picture is even worse in the mountain and hill districts than in the Terai. In fact, the great majority of phone lines outside the Kathmandu Valley are actually in municipalities.

Figure 5: Time taken to reach nearest phone booth¹⁰

Percentage of people taking this time to reach nearest phone booth						Mean time taken
	< 30 min	30 min to 1 hr	1 to 2 hrs	2 to 3 hrs	>3 hrs	
Overall						
Urban	93.6	3.2	2.9	0.2	0.1	9 minutes
Rural	45.8	14.5	13.6	8.7	17.4	2 hr 13 mins
Nepal	53.6	12.7	11.9	7.3	14.5	
Consumption quintiles						
Poorest	37.6	17.0	15.7	10.3	19.4	2 hr 13 mins
Second	40.9	15.4	13.7	9.6	20.4	2 hr 13 mins
Third	47.0	11.7	13.4	7.9	20.0	2 hr 13 mins
Fourth	53.8	13.4	14.0	5.7	13.0	2 hr 12 mins
Richest	78.6	8.0	5.0	4.5	3.9	1 hr 8 mins
Development region						
Eastern	54.9	11.6	9.0	7.9	16.6	
Central	62.6	11.9	15.0	6.5	4.1	
Western	55.0	15.1	10.3	7.7	11.9	

¹⁰ Source: Nepal Living Standards Survey 2, CBS, December 2004

Midwestern	38.7	13.6	9.6	4.7	33.4	
Farwestern	24.6	11.5	14.8	12.5	36.6	
Ecological zones						
Mountains	11.6	7.1	22.9	11.7	46.8	
Hills	40.6	10.1	12.7	12.7	23.9	
Terai	72.7	15.9	9.3	1.5	0.5	

Figure 6: Summary of telecoms provision in subdivisions of Nepal

Subdivision	Population 1000s	Population density per sq km	Municipal population %	% of VDCs with phone (Dec 03)	Fixed lines /1000 pop (Dec 03)	Revenue / fixed line NR/month (Dec 03)	DHQ with NT internet (local rate)	DHQ with NT mobile Service
E Mountain	402	39	10%	48%	3	1454	2 of 3	0 of 3
E Hill	1643	153	8%	43%	3	1400	7 of 8	3 of 8
E Terai	3299	454	15%	61%	14	1071	5 of 5	5 of 5
C Mountain	555	88	5%	37%	2	1081	1 of 3	0 of 3
C Hill excl KV	1898	174	10%	47%	6	1048	5 of 6	4 of 6
C Terai	3933	422	10%	43%	9	1066	7 of 7	7 of 7
W Mountain	25	4	-	100%	6	2702	0 of 2	0 of 2
W Hill	2793	152	14%	53%	7	1776	10 of 11	4 of 11
W Terai	1753	333	10%	58%	13	940	3 of 3	3 of 3
MW Mountain	310	15	-	15%	1	924	0 of 5	0 of 5
MW Hill	1452	106	6%	31%	2	1537	4 of 7	1 of 7
MW Terai	1231	168	15%	81%	9	1210	3 of 3	3 of 3
FW Mountain	398	50	0	37	1	687	0 of 3	0 of 3
FW Hill	798	118	8	49	2	1505	3 of 4	1 of 4
FW Terai	995	205	19	75	10	862	2 of 2	2 of 2
Kathmandu Valley (KV)	1645	1830	61	90	119	953	3 of 3	3 of 3
Eastern	5344	188	12	52	10	1110	14 of 16	8 of 16
Central excl KV	6386	241	10	43	7	1062	13 of 16	11 of 16
Western	4571	155	12	56	9	1319	13 of 16	7 of 16
Mid Western	2993	71	9	38	5	1258	7 of 15	4 of 15
Far Western	2191	112	12	50	6	945	5 of 9	4 of 9
Mountains	1690	33	4	38	2	1233	3 of 16	0 of 16
Hills excl KV	8584	142	10	46	4	1504	29 of 36	13 of 36
Terai	11211	330	13	55	11	1041	20 of 20	20 of 20
Nepal excl KV	21485	147	11	48	8	1150	52 of 72	33 of 72
Nepal	23130	157	15	49	16	1045	55 of 75	36 of 75

The rest of this section summarises the key points arising from the Sector Overview. Figure 9 lists actions that are required immediately to deal with known difficulties, and identifies the responsible agencies. Section 4.2 below, on competing for subsidies, includes a discussion of Nepal's own experience in this area.

Difficulties faced

- The current conflict makes development efforts of any kind much harder. Of course this includes provision of rural ICTs. But, unlike Nepal Telecom's telecom infrastructure, community ICTs (whether telecentres or community radio) have not to date been targeted for damage.
- Existing rural telecoms infrastructure is seriously lacking. In much of rural Nepal it does not exist. Where telephony does exist, it usually does not have a data capability sufficient for functional Internet access. Reliable electricity supply is also absent from most of rural Nepal.

Strong points

- Nepal benefits from a lively private sector in ICT, with several active trade and professional associations.
- There is much enthusiasm and commitment around Nepal for using new ICTs, especially among younger people. Computers are gradually becoming available in educational institutions, and where computer education is available it is popular and well-used.
- The number of privately owned Internet kiosks with modest IT resources, popularly known as Cybers, is on the rise in urban and semi-urban areas where telephone is available.
- Community radio is already a successful model for low-cost and effective rural ICTs.
- Strong community spirit and a tradition of volunteering are still alive in Nepal. Recent community-based development initiatives have built on these foundations, and active Community Based Organisations (CBOs) now exist in most Districts.
- Considerable experience of rural telecentres in Nepal is already available from several pilots. Lessons include the need for continuity of external support in a flexible manner which is sensitive to actual local needs, including the co-ordinated development of relevant content and services (involving among others sectoral line agencies and NGOs).
- There is potential for providing rural telecentres at Ilaka level, where other services (both private and public) tend to be clustered.

Regulatory action needed

- Internet use outside main towns is severely hampered by the need to pay long distance rates for connection to a private sector Point of Presence. Nepal Telecom's provision of local call rate access in 55 District Headquarters is welcome, and now to permit fair competition must be made available to all ISPs.
- Adoption of the new Telecoms Policy 2004, with its emphasis on open competition, was an important step towards overcoming many problems, which will best be dealt with by new entrants who are free to use any available technology (including Voice over IP).

- But the Policy now urgently needs to be implemented. Luckily, progress in this area can be made by amending existing regulations, without waiting for the passage of a new Telecom Act.
- For the time being, more active regulation of monopoly behaviour is required, in particular to ensure that private sector ISPs can obtain good quality leased circuits promptly and at reasonable prices.
- Free or at least easy access to "WiFi hot-spot" spectrum (as in most other countries) is important to allow valuable new technological opportunities to be exploited.

Institutional learning

- An organisational and physical base for rural ICTs is provided by current programmes for decentralised local governance.
- A possible institutional model for managing subsidies is found in the Alternative Energy Promotion Centre.
- Take-up of IT by central Government, though growing, does not yet extend to widespread use of email for communicating with outstations or the public.

4 Summary of other project findings

4.1 Summary of review of international experience

Our review of international experience of rural ICTs for development had two main parts:

- six selected case studies, chosen from a vast field for their variety and for possible relevance to Nepal;
- a review of the findings of other studies and reports in this field, each of which covered many individual projects using ICTs for development.

This section has three subsections:

- The first sketches the main learning available from the six selected case studies;
- The second identifies some additional international developments from which useful learning may be available;
- The third outlines the high-level findings from the review of other studies.

In addition, Section 4.2 briefly reviews international experience of competing for subsidies.

4.1.1 Selected case studies

The six case studies below were chosen for their relevance to Nepal, the availability of thorough and objective information about them, and to provide an illustrative variety of different approaches. Naturally, each application is specific to the circumstances and culture of the place in question. Nepal is always different. Even apparently relevant approaches could turn out quite differently if replicated in Nepal.

- The Gramin Sanchar Sewak scheme from Madhya Pradesh in India, where **postmen have been carrying mobile phones** on their delivery rounds for use as "mobile PCOs" (Public Call Offices) by villagers. This pilot scheme appears to be going well and is a candidate for replication in Nepal, where the Postal Department has full national reach, as mobile coverage becomes available.

- The Rurtel scheme for rural telephony in Laos, a country which almost parallels Nepal in poverty and remoteness. A **statistical study of matched pairs of households with and without telephony access** shows that provision of telephony access has a significant positive effect on incomes. We would expect similar positive effects in Nepal.
- The Jhai Foundation's **provision of computers to rural schools** in Laos. Some installations are already achieving financial self-sufficiency. The success of this initiative is largely attributable to the close, respectful and constructive relationships that the Foundation has built up with its served communities. The purpose-designed rugged computers that are used will also be of interest to Nepal once they enter volume production.
- The DakNet Mobile Ad Hoc Connectivity installation in Uttar Pradesh, where **bus-mounted Mobile Access Points** touring the area permit rapid data exchange to village kiosks equipped with suitable computers. The economics of this model point towards it being possibly applicable in some parts of Nepal, maybe with equipment mounted on motorbikes for use in hilly areas (as has been done in Cambodia).
- Examples of **e-post implementations** in India and Bangladesh. E-post is of special interest in Nepal because of its potential for improving the two-way communications service which is most used by many rural residents. However, services elsewhere appear to be rather expensive and to rely on commercial mailings to break even.
- Finally, we include a look at a **multifunctional item of terminal equipment** currently under development, the PCtv. The aim is to combine video, audio and text communications in a single low cost device with a simple user interface suitable for illiterate users. This is just one example (out of many) of technological developments targeted at developing country markets which may come to fruition over the next five years or so. They are worth monitoring through their trial stages, and will of course be interesting for Nepal if and when their prices come down to intended levels.

Another initiative of special interest for Nepal is worth mentioning here:

- India's e-Chaupal system¹¹ has grown rapidly in the last two years and continues to expand. This is a network of rural Internet kiosks which enables **farmers to deal directly with a large purchaser of agricultural produce** (the company ITC), bypassing traditional middlemen. At the same time the system provides access to other valuable information, and is a profitable venture. There is no company in Nepal that parallels ITC's role, nor of course can Nepal offer anything like India's scale of operations. However, it is worth exploring whether an alliance of NGOs and other interested parties could lead a similar venture in Nepal.

4.1.2 High-level findings of other studies

When studying international experience, it is important to bear in mind how young most projects in this area are. Even the oldest and best established rural ICT projects tend to date only from the mid-1990s. A recent proliferation of new projects means that most are much younger. Usually they need at least a couple of years to get set up and start to show results. This means that in a great many cases, it is simply too soon to look for useful learning.

¹¹ <http://www.itcportal.com/newsroom/wharton.htm>; presentation *Serving the Bottom Tier Markets: ITC eChoupal Experience Sharing*, by M. Srinivas Rao, to India Development Foundation, 15 December 2003, accessed at http://www.ibef.org/artdisplay.aspx?cat_id=194&art_id=1555 (article: *e-choupal mixes social goals with profitability*, by Nidhi Nath Srinivas)

The high-level findings of all the studies support common-sense and may seem to state the obvious. For example:

- ICTs are a tool for development, not an end in themselves.
- ICTs are most successful in reducing poverty when they are embedded within effective poverty-reducing strategies that encompass the wide range of social and economic causes of poverty.
- Successful strategies have to be sensitive to local conditions and subject to the dynamics of community life.
- This means a heavy focus on appropriate content and applications, and on building people's capabilities to access and use these. Physical equipment and infrastructure are also necessary but far from sufficient.
- It takes time for communities to learn to exploit the potential of new technologies. Premature withdrawal of outside support risks wasting previous investment and effort.

The large and fast growing body of Indian experience with rural ICTs is of special interest to Nepal, because of cultural and livelihood similarities between the countries. Our study benefited from early access to emerging findings from an APDIP survey¹² of over 2,000 respondents about benefits from ICT projects. Views were generally positive and encouraging – for example around half the respondents had used an ICT centre more than five times in the previous year and 81% of them had found it very useful or extremely useful. 92% placed high or very high value on the services of the centre from which 65% received increases in incomes ranging from reasonable to significant.

The examples from India suggest desirable development strategies that encompass one or both of two general areas:

- **the improved delivery of government services**, where services are comparable to those in Indian examples such as Gyandoot; Bhoomi; Community Information Centers (Sikkim); Tamil Nilam Touch Screen Project; FRIENDS Kerala; Mahiti Shakti; and Computer-aided Administration of Registration Department (CARD), Hyderabad; and
- **support for the agricultural economy**, seen in such examples as the Anand Milk Union; Tarahaat; E-Chaupal; Warna Wired Villages; and India Agriland; and in projects offering a mix of the two, such as Janmitra, Jhalawar (Rajasthan); SEWA, Ahmedabad (Gujarat); and N-Logue Telecentres Project, Madurai (Tamilnadu).

However, again we must be cautious when interpreting these findings in the context of Nepal, remembering that Indians on average are both better-off and more highly educated than the Nepalese¹³. In Nepal, there may also be a perception of risk to indigenous industry if Indian ideas are imported directly, maybe complete with Indian entrepreneurs.

¹² Asia-Pacific Development Information Programme (APDIP) study of 19 Indian projects involving ICTs for governance and poverty alleviation, called *Information and Communication Technologies for Governance and Poverty Alleviation: Scaling up the Successes*.

¹³ World Bank 2003 figures (latest available): GNI per capita \$530 for India, \$240 for Nepal; UNESCO 2002 figures (latest available): adult illiteracy 39% for India, 56% for Nepal.

4.2 Competing for subsidies

Nepal already has an embryonic Rural Telecommunications Development Fund, and this project must work out the best ways of using it, leading to a pilot competitive bidding process for subsidies. This section aims to highlight what we can learn from the growing body of international, and Nepalese, experience on competing for subsidies.

Based on a study of competing for subsidies in rural telecommunications in several countries, Figure 7¹⁴ identifies some key factors behind the success of this approach, when considering its applicability to any infrastructure services.

Figure 7: Competition among firms for subsidies: critical success factors

Demand factors	Supply factors	Enabling environment
<ul style="list-style-type: none"> Limited or no capital contributions are required from users Subsidies can be easily targeted to poorest users Users are able and willing to pay for services Service features are tailored to user needs and preferences Services have considerable growth potential 	<ul style="list-style-type: none"> Several firms are qualified to bid for subsidies Business opportunities are aligned with operators' strategies Project components are cost-effectively packaged 	<ul style="list-style-type: none"> Elements of market-oriented legal and regulatory framework are in place Government has access to stable and reliable sources of subsidy finance Private investors have access to long-term financing Donors and different tiers of government are able to co-ordinate financing policies National infrastructure networks are already relatively developed Institutional capacity is in place to implement and manage a competitive subsidy system

We note that some of these factors will be relatively easy to fulfil for ICTs in Nepal (eg “services have considerable growth potential”). Others are impossible, within the time-frame of this project (eg “national infrastructure networks are already relatively developed”). Most factors lie between these extremes.

Indicators of the success of a bidding process for subsidies may include:

- The number of bidders for each opportunity
- The amount of subsidy awarded compared with the maximum amount available
- The amount of private investment achieved per unit of public investment
- The public value of the projects that have been made possible by the process

Detailed relevant experience from two countries, Chile and Uganda, is available to this project, together of course with Nepal's own experience of competitive tendering for a subsidy for providing rural telecommunications in the Eastern Development Region¹⁵. Some

¹⁴ Source: *Private provision of rural infrastructure services: competing for subsidies*, by Björn Wellenius, Vivien Foster and Christina Malmberg-Calvo, World Bank Policy Research Working Paper 3365, August 2004. Countries mentioned include: Chile, Colombia, Peru, Guatemala, Bolivia, Nicaragua, Paraguay, Argentina; Uganda, Ghana, Benin, Cape Verde, Togo; Nepal.

¹⁵ Documented in *Output-based aid in Nepal: Expanding telecommunications service to rural areas*, by Hank Intven, Edgardo Sepúlveda, and Curt Howard, OBAApproaches Note Number 02, December 2004 (available at <http://www.gpoba.org>).

relevant material from Uganda is reproduced in Annex H. We have also considered how Peru's FITELE has been operating since 1996¹⁶. Below we summarise some points worth noting.

Latin America

- Chile's long and successful history of using competitive tendering for rural telecoms in a relatively prosperous country (between 1995 and 2002, access was raised from 85% to 99% of the population) has been confined to payphones. Annual bidding rounds started with regions needing least subsidy (at \$3 a head) and moved progressively outwards to the more expensive areas to serve (at \$45 a head). ICTs are recognised as a much more complex undertaking, in part because proposals must be assessed on merit as well as on cost¹⁷.
- Peru's pilot FITELE project, launched in 1997, provided public payphones to 213 villages in the North Border region. Like Chile, Peru is much more prosperous than Nepal, and only 30% of its population is classified as rural, but these people are scattered over a large and mountainous land area which is expensive to serve. Subsidies amounted to \$11 a head, considerably lower than initial estimates.

Uganda

- Uganda is much more similar to Nepal in its level of prosperity, and incidentally also in its size, but is significantly more advanced in liberalising its telecoms sector.
- Uganda's single bidding round so far (in late 2002) had 5 lots, of which two were non-network-related ICT projects (training and content creation). The other three, payphones, Internet Points of Presence and Internet Cafes, were seen as priorities and received most of the available funds.
- The Ugandan approach has defined six different levels of tendering procedure, ranging from international open tender for subsidies potentially exceeding US\$100,000, down to direct disbursement for amounts below US\$1,000. Direct disbursement on approval of a sound business plan is permitted in certain circumstances for amounts of up to US\$15,000.

Nepal

- Nepal's one experience of competitive tendering for rural telecommunications, in the Eastern Development Region, was of few bidders, resulting in a subsidy of US\$12m. This figure is low per head of population served compared with the examples from Chile and Peru (\$2 to \$4, rather than \$11 for Peru's pilot and up to \$45 in Chile), but it is more than double informed estimates of what a network to serve the region needs to cost. The episode has led to various reactions:

¹⁶ Main sources: *Telecom subsidies: Output-based contracts for rural services in Peru*, by Geoffrey Cannock, World Bank Note Number 234, June 2001 (series: Public Policy for the Private Sector); *Rural Telecommunications and Universal Access in Peru: Fund For Investment In Telecommunications (Fitele)*, Osiptel, 2002.

¹⁷ The Chilean experience is summarised in *Closing the Gap in Access to Rural Telecommunications, Chile 1995-2002*, by Björn Wellenius, World Bank Discussion Paper 430, 2002.

- It has been suggested that future exercises of this kind should clearly limit the available subsidy at the outset, based on demand assessment; should ensure terms of interconnection that will contribute usefully to covering the rural operators' costs; and should provide rural operators with other business opportunities.
- There is also a feeling in Nepalese circles that the conditions for tendering in this case effectively excluded local companies from taking part (even if this was not intended), and that in future the balance should be redressed.
- It is felt that the call charges being applied from the new PCOs are too high. Also, the PCO franchise terms on offer may not be attractive where traffic is low.
- Nepal also has considerable experience of managing subsidies in other sectors. The small subsidies available in the alternative energy sector (see Annex C and Figure 8), mainly awarded on the basis of technical assessment and a sound business plan, are regarded as particularly successful. Other examples are available from rural water and sanitation, and poverty alleviation.

Figure 8: Small-scale energy subsidies

Alternative Energy Promotion Centre: government subsidy policies

- Micro-hydro: 70,000 NR/kw (3kw to 100kw), plus up to 21,000 per kw transportation cost
- Solar: 5,600 to 11,500 or 50% of costs if less, higher amounts in more remote areas and for productive uses, reducing by 10% per year. Up to 75% for larger community owned systems if used for productive purposes.
- Biogas: 5,500 to 11,500 NR per family-size installation, depending on size of plant and status of District
- Improved Cooking Stoves: no direct subsidy, but support for information and development efforts

4.3 Key findings from workshops

The Expert Workshop and Public Workshop provided invaluable fora for the project team to test ideas, and for building consensus. Each event has been fully reported in a separate deliverable. Both events largely confirmed the evolving strategy proposals. They also brought in some new ideas, added important details, and pointed out gaps. This section aims to summarise the new material contributed by these events, without repeating material from elsewhere in this paper that they validated.

The Expert Workshop drew attention to ambitious plans for a five-year Agricultural Information and Communication Project, being promoted by the Ministry of Agriculture. This will establish ICT centres in villages where infrastructure exists, with trained manpower able to access a dynamic central website. A range of media will be used to disseminate agricultural information, including radio, television, CD-ROM and print as well as the website and email.

Several problems highlighted in the Sector Overview were seen as soluble by appropriate actions by certain agencies. Figure 9 below summarises recommendations made by the Open Workshop as a whole, and identifies lead responsible agencies.

Figure 9: Actions recommended by Open Workshop

	Finding	Required action	Responsible
1	Use of information systems, email, internet in government low	Educate officials, promote ICT use	MOST/HLCIT/NITC
2	Radio licensing regulations discretionary	Minimise discretion by extending and clarifying licensing criteria	MOIC
3	License fees too high for community radio and rural cable networks	Remove or greatly reduce fees for selected classes of activity	MOIC/NTA
4	Official levies too high for ISPs to expand in rural areas	Waive royalty and RTDF contribution for rural operators	MOIC/NTA
5	Telecom policy implementation slow	Press for rapid legislation; where possible, implement changes within existing legal framework	MOIC/NTA
6	Lack of backbone infrastructure	Encourage NEA to provide optic fibre along E-W and N-S power grid. Automatic Right of Way and no charge beyond cost recovery for laying cables alongside roads.	MWRPPPW/NEA Dept of Roads
7	Trunk rates for internet access - no local PoP or virtual PoP	Require NT to make same facilities available to competing ISPs as to its own Internet operation	NTA
8	Interconnection, leased circuit rates not regulated	Require NT to lease infrastructure to competitors promptly, at rates limited to cost recovery	NTA
9	No one-door policy spectrum to licensees	Unify licensing procedures	FMD/MOIC/ NTA
10	WiFi licensing position unclear	Free WiFi bands like elsewhere, at least for rural and out of Kathmandu	FMD/MOIC
11	Community radio problems	Implement agreed reforms	MOIC

Both the Expert Workshop and the Open Workshop clearly favoured a balanced approach to developing network infrastructure in step with user demands. The Open Workshop put forward a sample split of (say) 60% of funds to be spent on network infrastructure versus (say) 40% on user equipment, applications, training and other smaller-scale activities. It also suggested that the strategy should be geared towards achieving:

- a) *Short term* targets and goals in peri-urban areas and
- b) *Medium term* targets and goals in rural areas.

The following points also arose from the Open Workshop, in many cases based on earlier discussion at the Expert Workshop.

In general, for sizable infrastructure projects, providing subsidies in unprofitable areas on the basis of competitive bidding for least subsidy is a good approach. However, most community owned ICT facilities to be created in a demand-driven fashion may not be suitable for competitive bidding for least subsidy. Similarly, small access network facilities may be created under some sort of subsidy criteria without going into least subsidy bidding.

The RTDF already contains about 3 million dollars and to invest this fund does not require a separate entity. However, a separate management unit can be created within NTA acting as a secretariat with responsibilities of daily administration and project execution. There should also be a board of directors, government representatives and community representatives including operators (service providers), which can develop all the procedures, policies etc for ICT development, and monitor and evaluate performance.

It was recognized that sustainability issues of rural ICTs could be addressed to some extent by creating the demand for services by the communities themselves. Funds should be generated from the local bodies, including, for instance, VDCs and DDCs. However, the role of the State in sustaining the services in the context of more difficult and poorer communities cannot be ignored.

Providing access to physical facilities is important, but even more important is to insure its optimal use by creating value from the service for the community. Relevant content development was considered as an extremely important aspect for making ICT access worthwhile for the communities. Some participants strongly felt that this particular item was missing from this study.

Community Radio (CR) can be considered exemplary in the context of Nepal. However, lack of clear policy on community media and lack of laws and regulations on differentiating community radio from commercial radio are some of the barriers that are being faced by CRs. Community television could also be an important alternative for disseminating information and creating demand for ICT services in the local community, as visual and verbal media are effective in the rural context.

5 Towards a strategy for ICTs in rural Nepal

5.1 Principles

Based on the Nepalese situation and international experience as discussed above, we put forward the following principles as a base for the medium-term strategy. These build on the identified strengths of Nepalese society. As far as practicable, these principles should also be taken into account when identifying public ICT access pilots that can be implemented short-term (within the next two years or so), as required by the project Terms of Reference.

Diversity Nepal has a highly varied society. Terrain, climate, type of economic activity and level of prosperity, level of education, language, caste, ethnicity and culture all vary tremendously from place to place. Therefore we cannot expect any single approach to be widely applicable. Our strategy must be diverse – that is, it must include a range of options, varied enough to include “something for everyone”. Not only do we need a diverse range of ICTs, but also ICTs should be favoured which help to preserve this diversity by permitting production as well as consumption of content.

Natural growth It is an old saying that you must learn to walk before trying to run. In the same way, every community has to follow a progressive development path. For example, a school needs a teacher and a building before it can benefit from technology. New ICTs must be appropriate to each stage of development. And getting the most out of ICTs needs considerable learning. Even the use of a simple telephone may not be obvious when it first arrives in a community. Villages should have as long as they need to absorb each step, with appropriate outside support and training. Gradual change also allows for assessment of effects of new technology, and adjustment of the programme to take account of learning so far.

Oral society Nepal, and especially rural Nepal, remains a predominantly oral society. Speaking, listening and remembering what is heard come naturally to most people. This fits well with use of radio and telephone (fixed and mobile). Although literacy levels are rising,

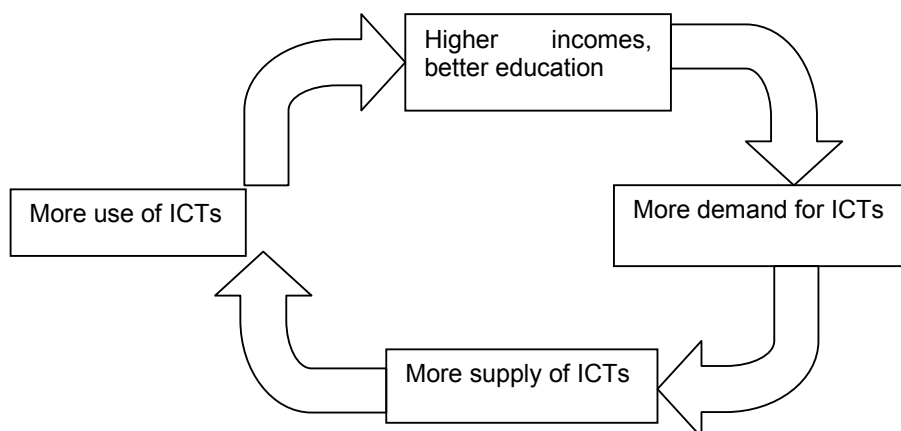
only a small minority of people are really comfortable with tools like the Internet which were designed in entirely different social contexts. ICT provision should build on traditional strengths, and include the provision of skilled intermediaries (“Internet scribes”) to make non-oral media easily accessible to everyone.

Community spirit and voluntarism Communities are still strong in Nepal, and people willingly give their time and effort to shared undertakings. The successes of Community Based Development, and of Community Radio, rest in significant part on this valuable heritage. There is a strong NGO sector in Nepal (both indigenous and internationally supported) which provides an excellent base for co-operative efforts.

Start with young people Evidence from Nepal, as from many other countries, is that young people take up new technology with ease, while their elders often see no use for it. The younger generation of Nepalese is far better educated than older generations, and so will have more scope to benefit from the Internet. From an economic point of view too, it obviously makes sense to invest in the skills of young people, as there will be a long period in which to reap the benefits.

Sustainability Outside assistance is of limited duration. To be of lasting value, projects must have the potential to be self-sustaining.

A main aim must be to break existing patterns of lasting poverty by creating a virtuous spiral such as the one shown below.



Interventions designed to increase demand for ICTs should be considered along with those designed to directly increase supply. In the Nepalese context, they may be more effective.

5.2 Overcoming barriers to ICT takeup

The main barriers to ICT takeup in rural Nepal may be identified as follows.

Supply side problems

- **Closed telecom market.** Lack of telecom connectivity is a fundamental obstacle to two-way communications. Much of the limited telephony infrastructure that does exist is not data-grade. Currently licensed operators are too few and have inadequate resources to meet demand – both more resources and new entrants are needed. Although there is now an official open market policy, it is still difficult to get a licence to provide network infrastructure in Nepal.

- **Inadequate resources to deliver services.** Private sector ICT activity in Nepal is vigorous but still small-scale. For example, there is not yet enough skilled manpower to deliver appropriate ICTs all over rural Nepal, even if other barriers were overcome.

Demand side problems

- **Not enough money to pay for services.** People in rural Nepal are generally very poor, living near subsistence level. They have little cash to spare for anything. There is undoubtedly a demand for access to make and receive phone calls (whether using fixed or mobile technology). To realise this demand it is essential to make it possible for people to spend very small amounts at a time, which points to shared access.
- **ICTs not seen as a priority.** People who are living without drinking water or electricity are unlikely to see ICTs as a priority. When basic essentials are in place, voice communications will usually be the first requirement. There is still a gap in understanding what the Internet can do, and because of a lack of locally relevant content and applications, the reality is that the Internet is of limited direct use to villagers.

All the evidence from other countries¹⁸ is that if such barriers are lowered, demand will grow, supply will meet demand, and rural ICT takeup will increase.

Any successful strategy for increasing access to ICTs in rural Nepal must therefore include the following components:

- **Open licensing.** Arrangements must urgently be made for new operators to enter the market legally.
- **Boost the supply side.** The private sector and NGOs need support in order to rise to the new opportunities. In particular, small firms need reduced bureaucracy, easy access to capital, and ability to hire skilled people in all areas. Public-Private Partnership arrangements are especially to be encouraged.
- **Inject cash strategically.** The lack of money to pay for services may be less of an obstacle than it appears. Even very poor communities will pay a small percentage of their income for communications (which people recognise can save them money, for example if a phone call replaces a journey), and with falling costs this is often enough to pay for shared access. But extra cash may still be needed where costs are high, to help excluded groups, or where expensive technology is required.
- **Mobilize communities.** Integrate the ICT agenda into community mobilization initiatives aimed at poverty reduction and sustainable development, especially in areas where local self governance programmes have been launched. The most appropriate institutional arrangements at the grass-roots level for implementation of rural ICTs are likely to involve partnerships, including for example local CBOs, NGOs and schools.
- **Add value to ICTs.** To make people want ICT access, its value must be increased. This means providing applications which help to deliver services in vital areas like health and agriculture.
- **Develop and share tools** There is scope for many useful new tools and techniques specific to Nepal, for example, easy computer interfaces for use where literacy levels and English language skills are low, local languages content, use of solar energy to

¹⁸ As summarised, for example, in our Review of International Experience.

power computer equipment, and business models for ICT based enterprises. Development of such tools and techniques should be supported and the outcomes shared by everyone.

- **Co-ordinate and collaborate** There are many current ICT initiatives which are more or less independent of each other. Co-ordination could increase effectiveness. ICTs themselves offer excellent tools to help, eg websites and email groups. Many of the proposals in this strategy can most economically be carried out through existing channels. Networks of (I)NGOs interested in particular areas such as kiosks, PCOs or community radio could be especially effective in sharing experiences of income generation, community management tips, etc.

The pilot stage of this project will be particularly concerned with the third of these points, how to inject cash strategically. But to make real progress, beyond a pilot, all these points and others must be addressed.

Observing the principles in Section 5.1 and aiming to overcome the barriers in Section 5.2, we propose a strategy for increasing ICT access in rural Nepal with four essential pillars. The first of these, the bottom-up demand-driven basis, builds on the principles (especially of using diversity, youth, community spirit and gradual growth). The other three pillars are there to make the first possible.

- Local facilities will be provided on a **bottom-up demand-driven** basis, with early support where appropriate from the RTDF – to ensure best fit to requirements, community involvement and commitment. These in turn maximise the likelihood of sustainability. (Section 6.2).
- A range of **supportive central actions** will be undertaken to transform the industry environment into one which is capable of fulfilling local demands, and to help communities to express their demands. Some of these actions may also receive RTDF support. (Section 6.1)
- In the short term (for the pilot), **infrastructure requirements** can only be met in part and pragmatically, recognising the difficulties posed by the security situation and by delayed sector opening. Medium term, the economical strategy will probably be to group neighbouring infrastructure requests for shared fulfilment through competitive tender. (Section 6.3.1.2).
- Tailored **institutional arrangements** are being devised to manage the RTDF and to monitor the developments that it finances. (Section **Error! Reference source not found.**).

6 Pillars of the strategy

6.1 Central actions

The central actions required fall into three categories:

- policy and regulatory reform to create an environment in which private sector enterprise can flourish – both in infrastructure provision and in local ICT partnerships
- support and co-ordination for the local demand-driven component
- other central actions

Below we list some important actions in each category.

Policy and regulatory reforms

- Implement open licensing as envisaged in Telecom Policy 2004 (and as foreseen since the 1992 Sector Reform). Waiving or minimising licensing requirements for small rural operators, and legalising Voice over IP, will be especially beneficial.
- Promote provision of optical fibres over the power grid, and their use as leased circuits.
- Regulate the prices and conditions of supply of leased circuits, interconnection for new telecom operators and dial-up Internet access.

Support and co-ordination for local demand-driven component

- Increase awareness and understanding of ICTs, for example through radio and television broadcasts and tailored video programmes for particular communities.
- Incorporate topics relating to rural ICTs in regular capacity development programmes conducted by the Ministry of Local Development's Local Development Training Academy for the staff and elected officials of VDCs, DDCs and municipalities (including in particular DDC Information Officers in DLGSP DDCs). Develop tools, guidelines and methodologies to be used by local actors for integrating rural ICTs into local development agendas.
- Circulate examples like those above to all Districts and as many VDCs as practicable, asking them to include ICTs in their participatory development planning.
- Support preparation of proposals for ICT introduction, for example ensuring that staff training and equipment maintenance are properly covered and that business plans are realistic.

Other central actions

- Properly resource central organisations like the NITC to enable rural ICT experience to be shared.
- Produce attractive and accessible development content (in local languages and minimising literacy requirements) for distribution via broadcasts, CD-ROM, Internet or otherwise, as appropriate.
- Adopt ICTs in central Government: for example, encourage telephone and email communications between civil servants and ordinary citizens.
- Provide good data connections among Nepalese universities, and link them to external academic and research networks (for example, through the Asia-Pacific Advanced Network¹⁹ group).

6.2 Some alternative community development paths

Figure 10 below illustrates some possible ICT development paths that different types of community could choose, in various forms of partnership. These could eventually become either financially viable, or clearly justifiable in terms of development benefit.

¹⁹ See <http://www.apan.net>

Figure 10: Illustrative community ICT development paths

	Development path	Finance partner	Candidate locations	Remarks
1	Provide computer(s) in a secondary school for educational purposes; open for public use outside school hours; later (when phone service arrives, or through ad hoc WiFi connectivity), link to the Internet.	Education budget; Rural Electrification programmes (to ensure power available)	4,350 secondary schools, 789 higher secondary schools	Expands skill base and future market as well as meeting current demand
2	Expand existing PCO business to provide assisted email service through Internet connection.	Private sector	Estimate 1,500 village PCOs	Only some have right skills and could be commercially viable
3	Provide Internet and phone for an NGO-led development project; extend capacity of installation beyond the project's immediate needs so the facilities can be shared by outside users.	NGO/central Ministry	75 Districts, 650 VDCs reached by DLGSP	Could be standard practice, where feasible, for government/NGO projects
4	Provide phone at all health centres, available as PCO; later Internet access (for both health workers and public)	Health budget, telecom operators	3,160 sub-health posts	Needs central co-ordination from MOH to get best value
5	Support local initiatives like Mahabir Pun's Internet connections in the Nangi area.	International philanthropy	Few	Depends on exceptional individuals
6	Get postmen to provide a growing range of communications services to villagers as local connectivity improves (eg post → e-post → use of mobile phone)	Postal Department, private sector courier services	200 fast-track rural market centres (RMCs)/Ilakas, up to 1,500 RMCs	Good use of existing postal resources but requires major network infrastructure expansion
7	Build use of existing multipurpose telecentres by making usage affordable and actively publicising the services available.	NGO/government	Under 20	Exploit existing investment more fully; use these as base for developing applications for wider use
8	Start community radio stations, later connect office to Internet	Local enterprise, NGOs	Many communities ready now – 5 a year could be supported	Proven Nepalese model, very cost-effective way of reaching many people
9	Link cable TV stations to Internet, give social mission, provide public access to both TV and Internet	CATV entrepreneurs	~750 towns have CATV	Could serve urban poor and peri-urban residents
10	Provide computer access for all students in further/higher education, and Internet access in all colleges	Education and vocational training funds	15 technical schools, ~170 private training institutions, 5 universities with ~300 campuses	See comments on schools; but more investment justified for each institution
11	Rural banks to modernise branch communications, while providing PCO service	Banks	See Ilakas/RMCs above	Banks will soon need to modernise to stay in business
12	Incentivise existing cybercafes to attract wider clientele and set up new branches to serve marginal groups	Cybercafes	1,000 in larger towns	Good way to reach urban poor and peri-urban residents
13	Provide radio/TV sets for shared community use; later, could record programmes for individual replay	Broadcasters	Thousands of small, remote settlements	Satellite broadcasts now reach everywhere but not everyone; shared use requires responsible leader and suitable

				shelter
14	Link telecommunications upgrade to developing tourism	Entrepreneurs	Hundreds of attractive locations	Different tariffs for tourists and locals
15	Low cost "telegraph" system using Citizens Band Radio	Local government/ entrepreneurs	Areas isolated by conflict	A stop-gap measure to reduce isolation

We see these as being incorporated in existing development efforts along the following lines:

- Each local community, once it has understood the potential of ICTs, will include one or more suitable ICT development path in its development agenda.
- They can choose their community development paths from a big menu - Figure 10 just provides examples.
- Where needed, they can receive subsidy from the RTDF, and technical support for planning and implementation.
- The degree of subsidy will vary (see below), but in general communities will contribute financially from the start and will cover running costs after an initial period. This means that they will need to look at how the path can generate income. In some cases loans rather than grants may be considered: this would increase available funds for other projects, at the cost of increased administrative overheads.
- Some projects will need a network infrastructure component. This is discussed in Section 6.3.

In Figure 11, we show which types of path we expect to be more applicable in the different types of area covered by this project, and which we expect to need subsidies. For clarity, we are using the following definitions:

- Urban areas are those officially defined as municipalities (mainly, towns over 10,000 population), with the exception of a few small new municipalities, which we classify as semi-urban.
- Peri-urban areas are those within an hour's journey of an urban area (say, a 10 km radius periphery).
- Semi-urban areas are places with the following facilities and conditions:
 - Rural market centre
 - Telephone exchanges
 - New municipalities lacking all urban infrastructures
 - Least developed District HQs
- Rural areas are the rest of Nepal.

Figure 11: The development paths by type of area

	Path	Urban	Peri-urban	Semi-urban	Rural	Subsidy
1	E-payment	Yes	Yes	Some		No
2	E-post	Yes		Yes		No
3	"Walking PCOs" (eg mobiles carried by postmen)		Yes	Yes		No

4	Community radio base station	Yes*		Yes*		Yes
5	Community telecentres	Yes*		Yes*	Some	Yes
6	Cable TV	Yes	Yes	Yes		No
7	Computers in schools	Yes	Yes	Yes	Yes*	Yes
8	Agricultural information centres			Yes		No
9	Phones at health posts		Yes	Yes		Maybe
10	Expand PCO services			Yes	Yes*	Yes
11	HF data messaging service			Yes		Yes
12	E-money transfer			Yes		No
13	Replace destroyed phone links			Yes	Yes	Yes

Of course, initiatives in semi-urban places will benefit rural people from a wide catchment area. Starred items may be especially worth further attention. Annex A looks at a few of these in more detail. We have found, for example:

- A community radio base station can be set up for an initial cost of between about \$25,000 and \$50,000. Because of voluntary support from the community, running costs are low and are normally covered by earned income. Such an installation can benefit hundreds of thousands of listeners. Providing Internet access to the CR base station deepens the benefit. Based on existing support capability, we propose a roll-out of 5 community radio base stations a year from 2005, to reach 90% of the rural population by 2010.
- Computers could be provided to 5 suitable schools in a District for an initial outlay of \$36,000 per District, with a reasonable expectation of sustainability on balance (assuming the schools were from a mix of more and less commercially promising areas). The initial outlay could be reduced by carrying out the project in co-operation with an existing NGO which is already involved in this type of activity. Figure 12 gives a sample roll-out programme, which naturally is more definite in its earlier stages.
- Assuming connectivity is available, a well-equipped telecentre (with 3 PCs, a fax machine and a photocopier) can be set up for an initial outlay of around \$5,000 and, in a rural market centre, can reasonably expect revenues of around \$800 a year. The critical factor in assessing viability is operational costs, and in particular the level of continuing expert support that is needed (which could cost double the expected revenues).
- Where connectivity is available, the first PCO in a rural community of 200 people will usually cover its running costs and provide a modest supplementary income to its manager (who is assumed to have another source of income, for example from running a shop alongside the PCO). The set-up cost is only the special telephone and any necessary accommodation extension or conversion, which should not exceed \$500 (including solar power). Nepal Telecom currently charges a deposit on PCO operations of up to NR 50,000 or \$700 (for VHF lines), and making this deposit possible could be what is needed in some communities.

Figure 12: Sample roll-out programme for computers and Internet to schools

	Action	Date	Remarks
1	Provide computers to secondary schools or higher, for learning to use computers, wherever there is electricity supply and local competence and interest	By 2007	Support NGOs like COPPADES to accelerate this provision Through some subsidy work with MOE as well
2	Provide Internet access to schools already equipped with computers and requesting it	By 2008	The access network could be used by RMCs as well
3	Provide computers and Internet access to 25% secondary schools using solar power where no electricity is available	By 2009	Solar power for 3 to 4 hour use per school day to be sourced from AEPC programme or like
4	Provide computers to 90 % of secondary schools	By 2012	As above but more NGO may have to be developed and supported
5	Cover secondary schools 100%, and lower secondary schools say 80%, with computer and Internet	By 2015	Massive scheme, just tentative for the moment

6.3 Network infrastructure

6.3.1 Universal access to telephone networks

There is well-established demand for telephone service in Nepal's rural areas (see Section 7.2). Unfortunately, Nepal has suffered a period of stagnation (and, in conflict areas, decline) in provision of rural telecom infrastructure. We are pleased to see that Nepal Telecom now has firm plans for renewing and extending its rural networks:

- Through CDMA (fixed wireless systems), telephone service at normal PSTN tariffs will be made available on demand in most parts of the country. Current plans (for completion by mid-2007) include some coverage in every District. Based on assumptions about the distribution of population and NT's roll-out plans, we estimate that 81% of the rural population live within this planned coverage. A second stage of CDMA deployment should further extend this coverage, to maybe 95% of the rural population by 2010.
- These CDMA base stations will be linked by a new backbone network, using fibre, microwave and satellite technologies. By mid-2006, all District Headquarters towns will be able to access the Internet at local rates through NT's network.

Figure 13 below (for which we thank Nepal Telecom) illustrates current plans for deploying the first phase of 1m lines (fixed and mobile, in proportions not yet firmly decided) by July 2007. (200 base transmission stations (BTS) are planned, but fewer than 200 locations appear on the map because some are close together). Note that the base station symbol is standard and not to scale, but the overall impression given of total coverage should be reasonably accurate.

Figure 13: Current NT plans for Phase 1 CDMA deployment



In addition, the rural operator STM is extending access using VSAT technology in its licensed region (Eastern Development Region (EDR)).

Our proposed strategy for extending network infrastructure access in rural Nepal builds on these plans of Nepal Telecom and STM. This is for the following reasons:

- Rural areas of Nepal can mainly be served most economically by terrestrial radio systems (as we discuss below). While satellite terminals work anywhere and can be deployed fast, they are unnecessarily expensive for most of the country.
- Alternative strategies, which in principle might involve new large-scale subsidised operators selected by international competition (as happened in EDR), appear unrealistic in current circumstances.
- We believe that NT has good commercial incentives to carry out at least the first stage of the plans outlined above.

6.3.1.1 Objectives for rural telephone service

For rural telephone service, we therefore propose the following draft national objectives:

By mid 2007: Telephone service, at (or near) normal now current NT PSTN rates, available within a week of request, throughout areas covering 81% of Nepal's population.

By 2010: Telephone service, at (or near) normal NT PSTN rates as they will be then, available within a week of request, throughout areas covering 95% of Nepal's population.

Continuing: At least one phone line to be installed and available for public use in any community over 500 people, which is within an area of radio coverage for telecom service (eg within range of a CDMA base station), and requests this. If funds permit, this could be extended to communities over 200 people - working towards the eventual objective of "phones within shouting distance" for everyone.

Our analysis suggests that the targets of coverage of 81% and 95% of Nepal's population are both technically and commercially achievable through NT alone. The major obstacle to their achievement is likely to be the security situation. Public policy could set higher targets (for example, 85% of population in 2007 and 98% of population in 2010), using the RTDF to help "fill the gaps" not covered by market forces (through NT, STM or other competing operators).

6.3.1.2 Strategy for achieving rural telephone objectives

To achieve these objectives we propose the following steps. Here we use the term NTAR to mean the national supervisory and support body for rural telecoms discussed in section 6.4. In devising this strategy we have tried to meet the following objectives:

- Ensuring that NT fulfils its roll-out plans
- Fostering competition to NT in rural areas
- Ensuring viability of small competitors
- Getting value for money from subsidies.

Achieving any one of these is a challenge. Achieving elements of all four will be a continuing balancing act, requiring periodic review and adaptation to changing circumstances.

1. Nepal Telecom should be required to publish (say, by September 2005) its CDMA and Internet coverage plans, showing in detail the boundaries of expected service availability by mid-2007, and longer-term plans in outline. All these plans must be available to NTAR, and local detail must be publicly available within each area (for example, at each District Headquarters).
2. Each year, NT should update these plans with rolling plans looking two years ahead in detail as well as longer-term plans in outline, and showing actual achievement to date.
3. If it is felt necessary, a continuing incentive for NT to fulfil or exceed these roll-out plans could be introduced, for example in terms of its current RTDF contributions being reduced for meeting targets, or contributions made from the RTDF towards providing enhanced service levels.
4. In principle, RTDF subsidies will be available for providing telephone coverage to rural areas that are outside NT's planned boundaries for service provision. Subsidies will be calculated on an objective basis (related to characteristics such as terrain, remoteness, population and likely wait until NT's service arrives²⁰). The basis of calculation will be published, and will be revised from time to time in the light of experience. Spending the subsidies will be controlled by the beneficiary communities.

²⁰ It is desirable to avoid subsidising operations that are unlikely to withstand competition from NT, when this is imminent.

5. Beneficiary communities may well group together to get best value telecom service using their subsidy funds. NTAR (through District level support bodies) will help such groups to form, and provide them with expert advice on technical options and any needed help with procurement. Their options may include, for example:
 - Where both phone service and Internet are urgently required, small operations using radio technologies such as WiFi may be economic, run by local entrepreneurs in partnership with the communities (possibly, sharing equipment procurement so as to get lower prices).
 - Inviting existing operators (NT, UTL, STM and Spice) to bid to provide coverage (which could be using fixed or mobile phones, or VSAT terminals) at the lowest price.

Sample costings provided in Annex K suggest that at present it is hard to improve on NT's CDMA system in cost terms, other than for small remote communities which cannot be reached by terrestrial transmission systems. But radio technology is advancing fast and costs are declining, so this may not remain true for long.

6. Any new operations formed by this process will automatically be licensed to provide telecoms infrastructure and services within their own subsidised area and any adjoining area (so they could, if they chose, compete with NT). They will also have rights to interconnect with NT at an appropriate nearby point, and with each other. As a contribution to running expenses, they will receive a fair share of the revenue from incoming calls.
7. Eventually, a group of "gap" operators might choose join together to offer national or international transmission services in competition with NT. The prospect of this happening should encourage NT to provide the fullest coverage it can, as quickly as it can.
8. Once phone lines are available on demand, we expect that market forces will lead to at least one publicly available phone being provided in the majority of communities within telephone service radio coverage areas. Where this does not take place, a small start-up subsidy for a PCO will be available to each qualified community (after a suitable waiting period, such as a year, to discourage inappropriate take-up).

6.3.2 *Public Internet access points*

As explained below, demand for Internet service in rural Nepal is still very low. To a considerable extent, we expect that the roll-out of rural telephone networks as proposed above will also provide Internet-capable infrastructure. Where this is so, making public Internet access available "only" requires suitable end-user equipment, premises, and support – a significant challenge, but one which can be met in many different ways, using the demand-driven community-based approach of Section 6.2. We are also aware of commercial initiatives to provide Internet (and, when permitted, voice over IP) services from stand-alone kiosks connected by VSAT terminals.

Internet is needed in all District Headquarters for administrative reasons. In order to grow demand and make Internet service accessible to as many people as possible, we propose fostering public Internet access points (assumed to offer affordable rates) in selected Rural Market Centres (RMC).

6.3.2.1 Objectives for public Internet access points

Draft objectives may be framed on the following lines:

By mid 2006: at least one public Internet access point in each District Headquarters town.

By 2008: at least one public Internet access point in each “first round” selected RMC.

By 2010: at least one public Internet access point in each “second round” selected RMC.

The “selected RMCs” will be identified so as to include the highest reasonable proportions of the local VDCs’ populations within their joint hinterlands. Identifying such RMCs is a detailed task beyond our immediate scope, but easily within the capability of local groups with central support.

Between 1996 and 2002, the Department of Urban Development commissioned the Central Department of Geography at Tribhuvan University to carry out studies of small towns and market centres in 34 Districts. Based on scanning these, we estimate that it should be possible to “cater for” good proportions of VDC populations (say, half or three quarters) by providing Internet access at a few RMCs in addition to the District Headquarters. Our rough estimates for the number of RMCs which may be required in different terrain types are shown below.

The selected RMCs will often be the Ilaka centres referred to earlier. Electrification will normally be seen as a higher priority than Internet, and adequate electricity supply will make provision of public Internet access much cheaper²¹, so we expect that the roll-out programme for public Internet access will generally follow that for electricity.

Terrain type	To cater for 50% VDCs of District (“first round”?)	To cater for 75% VDCs of District (“second round”?)
Mountains	DHQ + 0 or 1 RMC	DHQ plus 1 or 2 RMCs
Hills	DHQ plus 1 to 3 RMCs	DHQ plus 2 to 6 RMCs
Terai	DHQ plus 1 to 3 RMCs	DHQ plus 3 to 5 RMCs

By “cater for a VDC” we here mean “provide an Internet access point in a place which is commonly visited (for other reasons, eg buying goods or selling produce) by people from that VDC”. We expect this means that it will be possible for messages to be carried between people in the VDC and the Internet access point, say once a week, without anyone making a special trip.

We call this “Internet within walking distance”. This is not a high level of Internet access, but we feel that at the moment, no more than this can be justified as a universal provision. Of course, in many areas greater provision will be achieved by market forces.

We are deliberately not specifying the type of public Internet access point that should be provided. We expect this to vary from place to place. In some places, private entrepreneurs will open commercial cyber cafes. Elsewhere, the Post Office may introduce e-post points; a school or college which has obtained Internet access may offer access to the public outside

²¹ Stand-alone electricity supply (such as solar panels) to such installations often doubles their cost.

school hours; an Agricultural Information Office may include Internet access; a Community Radio base station may provide public Internet access; and so on. It is up to the DDC to monitor what is available and what else is needed.

6.3.2.2 *Strategy for achieving public Internet access objectives*

In order to achieve the draft objectives above we propose the following strategy:

1. By the end of 2005, each District should identify and publish first and second round RMCs (for public Internet access points by 2008 and 2010 respectively) which would “cater for” local needs to agreed levels. In each DLGSP District, an Information Officer should already be in post, and these people would seem obvious candidates to be trained to incorporate ICT needs into planning processes.
2. Nepal Telecom is already committed to providing Internet at local rates in all DHQs by 2006. DDCs will automatically benefit from this service, and they should take responsibility for ensuring that the public can also access the facility.
3. Annually, as part of normal planning processes, each District should report on actual availability of public Internet access within the District.
4. Normal market forces, plus the demand-driven community based process put forward above for increasing access to ICTs, together are likely to lead to some additional public Internet access points.
5. To strengthen the private ISP sector outside Kathmandu, the RTDF could usefully support the formation of regional internet exchanges (NPIXs). Annex J outlines a project proposed by members of the current NPIX.
6. In 2007, the NTAR, in consultation with Districts, should review progress towards the 2008 objective (“first round” RMCs). Where the objective is still felt to be appropriate and is unlikely to be achieved without outside help, then subsidies may be offered to help it to be achieved. Where new network infrastructure is required, a process of community grouping with central support, similar to that outlined above for telephone infrastructure, should be followed.
7. Similarly, in 2009, the 2010 objectives (“second round” RMCs) and progress towards them should be reviewed, and such subsidies may be offered as seem necessary at the time.

6.3.3 *Telecom network design for Nepal*

Networks designed for the future should consider the convergence provided by IP networks. The wireless technology WiFi which is currently developed on open standard IEEE 802.11 b/g/a wireless is relatively cheap (more details are provided in Annex K) and can be deployed to provide both Internet and telephone service. WiMAX may prove another useful wireless technology. Again, IEEE 802.16 is an open standard, likely to come out towards the end of the year 2005. Open standards have the advantage of being cheaper and prices fall with large scale deployment.

However, implementation of Telecom Policy 2004, including legalisation of Voice over IP, and freeing of WiFi spectrum from licensing, is essential to allow these technologies to be fully exploited in Nepal.

Below we discuss terrestrial network design in Nepal and the role of satellite systems. Annex K provides some further information on systems, including indicative costings.

6.3.3.1 Terrestrial Network Design in Nepal

It is easier to create satellite networks for remote locations in difficult topography. However, the cost of space segment (leased satellite bandwidth) is still quite high which makes them rather expensive to operate.

Wireless is, indeed, a good solution for hilly and sparsely populated areas, and that is the reason all the backbones, spurs and a substantial part of rural access networks consisted of wireless. As traffic levels grow, fibre becomes economical in the backbone and main spurs, and this is already starting to be installed in Nepal. Experience shows that in the Nepalese situation, as the backbones and spurs move towards Northern hilly regions, covering the district headquarters with terrestrial wireless systems is not too expensive or difficult. The access network will be mainly wireless, using mobile and fixed wireless or point-to-multipoint wireless systems, which can be further extended through wires in concentrated settlements.

With the increasing number of power projects in the hilly areas, coupled with the necessity of building power lines in the northern areas for connecting hilly district headquarters to the National Power Grid, Nepal Electricity Authority will lay fibre through OPGW (Over Power Ground Wire) as it is doing now in more populated areas. As the future power grid extension will include fibre in the OPGW, this process should be speeded up by government action in those areas where power lines exist. This will help establish very high capacity backbone links even for hilly towns. However, spurs to rural areas can be extended by wireless in hilly areas.

Most of the population of most of the hilly districts can be covered by about 2 to 3 hops of radio links on average, in three directions. By using point-to-multipoint systems, several villages can be covered by a repeater even in the hills. For example, 17 districts have been categorised as Mountain Districts. With the exception of Humla, Mugu and Dolpa, all Mountain Districts had been reached by terrestrial radio links. Solukhumbu had a radio link station at the altitude of 3300 metres (Mount Everest Area) serving one telephone exchange nearby. Most VDCs of Darchula, a Mountain District, had terrestrial systems installed in the past - only two VDCs were located further north than their reach. Thus a large part of the population of even the Mountain Districts also can be covered by terrestrial systems, which will work out a lot cheaper than satellite.

6.3.3.2 Satellite Communications Network

Current examples of calls for districts being charged at Rs12 a minute through STM Communications VSAT network in the Eastern Development Region are unpopular and unaffordable. However, satellite systems still will have a place in some areas, because of their reliability and the speeds with which such systems can be deployed. Satellite will remain a viable solution for short-term urgent needs, for the remotest areas, and those parts which otherwise remain hidden behind the mountain/hill folds (in shadows for terrestrial radio waves). However, as time progresses, terrestrial systems will move northward, thus replacing the satellite systems established earlier for thin coverage. For broadcasting, satellite will always have an edge over other systems in hilly areas.

6.3.4 *Internet access infrastructure*

6.3.4.1 *Backbones and spurs*

Internet, like mobile or fixed wireless, has to ride on backbones and spurs. The telecom backbone and spurs infrastructure described above is suitable for Internet as well. However, there is another possibility, which takes advantage of the asymmetrical direction of flow of Internet information. Information received is often much higher than sent (unless uploading is the purpose of the access). Taking advantage of this feature of the traffic, satellite could be used for downloading information in broadcast mode (called DVB) to the district level, which is then extended to the Internet users in nearby rural areas through terrestrial wireless links.

6.3.4.2 *Internet Points of Presence*

Private sector POPs, at the present moment, are only present in major towns of the country. These POPs are equipped with international backhauls directly linking them with USA or Canada, because the users usually, in absence of national content, want information from outside the country. The exchange of national traffic between these POPs generally takes place through international backhaul.

Lack of national content that would be useful for rural communities, and rather small size of Internet user community at district levels, are the basic reasons that private sector POPs are not present in the district headquarters. The Internet demand in the headquarters of the hilly or tarai districts where major towns do not exist is rather low and does not justify presence of ISPs, other than that of Nepal Telecom who already has offices for telecommunication services at district level. However, in many of these districts even NT does not find economic reason to establish local POPs and Internet service is being provided through virtual POPs (physically present in bigger towns). Therefore, the business case to establish private sector POPs in the district levels will not arise for some time to come in future. Still, rough costs for a new POP are provided in Annex K.

With this fact in mind, the Workshop on Strategy recommended that NT, as the incumbent operator providing access to users in the districts to its own POPs at regional centres at local call charging rate, should do the same to users of Internet who wish to subscribe to private ISPs within their development region no matter where the POP is located in that region. This will eliminate current trunk rates applicable in such cases for Internet users of one district while accessing their POPs in the other districts. A discussion note (provided as Annex I) explaining that this recommendation will not impact NT's traffic handling of rural (remote line units) exchanges was prepared and distributed to top management of NT. Top management seems to be quite sympathetic to the recommendation and implementing it seems possible.

This provision will eliminate any requirement to provide financial assistance for private sector to build POPs in the district level for users to obtain service from them at local dial-up charges. However, assistance would be needed for wireless access networks for communities located within the district but out of the headquarters, in absence of proper infrastructure to do it, at least for some 3 to 4 years from now.

Other assistance required is in building the capabilities of NPIX in developing local Internet traffic switching capability in the country.

6.3.4.3 *NPIX and Regional Internet Exchanges*

The establishment of Nepal Internet Exchange (NPIX) in 2002, as an activity of ISP Association of Nepal with support from Computer Association of Nepal and other related bodies, has proved to be highly beneficial to the local Internet Community. In essence, the local exchange of traffic has grown from a nominal 200 Kbps in 2002 to more than 3 Mbps cumulative at the end of 2004. While this may not seem significant, it represents about 10 percent of the national Internet bandwidth capacity. The growth factor itself speaks for the benefits of the Internet Exchange.

To further extend the benefits of local traffic exchange, it is necessary that the successful model of operation be replicated in other major urban areas of Nepal. A need for local exchange facilities in the four cities of Biratnagar, Pokhara, Bhairhawa/Butwal and Nepalgunj is foreseen. Birgunj and Dhangadi can also be considered if the local situation demands it. The proposal is to enhance the capacities of the operators in those regions and also make the national Internet infrastructure more robust. A detailed proposal of this kind is provided in Annex J.

6.4 Institutional arrangements

6.4.1 *Institutions for communication infrastructure and other ICT facilities*

The Telecom Act stipulates that Nepal Telecom Authority (NTA) is entirely responsible for creating and disbursing the Rural Telecom Development Fund²². In accordance with the agreement between HMG and The World Bank, NTA is responsible to carry out the project works under Telecom Sector Reform Project with the proceeds of IDA Credit apportioned for rural ICT facilities other than rural telecom infrastructure. In the absence of any properly organised body to carry out major ICT initiatives in the rural and peri-urban areas, it is only reasonable that NTA manage the activities to create ICT facilities under current IDA Credit to avoid any delays in implementation. Looking ahead, however, we recommend that NTA focus on its regulatory functions and managing the provision of rural communications infrastructure requiring subsidy and NTA pass on the responsibility during the main period of expansion of other rural ICT facilities, say beyond year 2007, to some other Autonomous Agency. Our reasons are:

- The task of assessing and fulfilling rural ICT demand other than rural infrastructure is varied, large, and requiring community mobilisation thus onerous one, which NTA is currently not equipped to perform. Taking on this task could unbalance NTA's structure and distract it from its proper regulatory functions, and it would not be in the interest of NTA on the long run.
- Many other parties, besides NTA, have a strong and legitimate interest in the outcome.
- In particular, the new Agency will have to work very closely with MLD, local bodies such as DDCs, VDCs and directly with the communities concerned.

The Open Workshop agreed that there is a need of an independent and semi-autonomous unit, suitable for managing subsidies and implementing the programme that focuses on development of ICTs in rural areas and promotes demand for communication activities in rural areas. There are good precedents in Nepal for such bodies managing demand driven community based programmes, including:

²² Existing documentation relating to RTDF is provided for convenience in **Annex B**.

- Rural Water Supply and Sanitation Fund Development Board (RWSSFDB)
- Alternative Energy Promotion Centre (AEPC)
- Poverty Alleviation Fund Board (PAF)
- Media Development Fund²³

These are all proving successful in different ways. AEPC and RWSSFDB were set up by Cabinet Decision, and PAF by a separate Act. AEPC is a regulatory body but has implementation authority for promotional programmes. Both RWSSFDB and PAF both directly work with communities, providing funds for implementing rural development programmes Annex L provides detail on RWSSFDB, and Annex C reports on discussions with AEPC. Many elements from their experience will be directly applicable to the new rural ICT body.

We therefore recommend:

- Two separate types of Fund for ICT development one being the RTDF (rural telecom infrastructure) as it stand now and the other being contributions of Donor and HMG, INGOs and NGOs (let us call it ICT facility development fund-IFDF). RTDF will remain in the domain of NTA whereas IFDF will be managed by the new governing body suggested below.
- NTA will continue to manage universal access telecom infrastructure projects envisaged under RTDF as it is doing currently and also rural ICT facilities development other than rural telecom infrastructure during the life of Telecommunications Sector Reform Project with the project fund. NTA is advised to manage these rural ICT facilities related activities in cooperation with HMG's Project Units like (DLGSP and RUPP) and local bodies to take the advantage of their skills and capabilities in social mobilisation established in community driven projects and also work with NGOs carrying out similar work. This cooperation will help NTA to rapidly move into implementation and limit the size of the workforce for the activities which eventually are to be handed over to the new Agency.
- A new governing board or body should be institutionalised for fund management, policy development and development of project format and approval of the ICT projects other than belonging to rural telecom infrastructure. The structural composition of the proposed institution will incorporate all the main line agencies and concerned stakeholders. All concerned Ministries (at least, MOIC, MOST, and MLD), NTA and Operators, local representatives, ISPs, professional and experts – including women would play important role. This body could start functioning with resources generated beyond already available contributions of the IDA Credit in the TSRP and any contribution.
- A new management unit should be formed, which will be responsible to this governing body. This will work as a secretariat with responsibilities of daily administration and project execution. We should think in terms of this growing rapidly to 10 to 15 staff, hired through open competition with good remuneration.

²³ The revolving Media Development Fund (<http://www.presscouncilnepal.org/>) was established under the supervision of the Press Council with a fund of Rs.15 million made available by the Danish Government and 10 million by HMG as a matching fund. The Fund provides interest subsidies to publishers as well as FM stations on bank loans taken to purchase offset press, computers, and other equipments. The subsidy is provided from the interest earned from the core fund. The Fund is run by a six-member Sub-Committee headed by the Chairman of the Press Council (Council members are appointed by HMG under the provisions of the Press Council Act 1992) and includes the President of Federation of Nepalese Journalists, representatives of Nepal Press Institute and Himalayan Bank as members.

- As the programme rolls out to different parts of the country, we envisage that expert units will be set up, probably at District level, to provide ICT advice and support to communities. These units will help both with applying for financial support and with implementing ICT projects (whether or not subsidised). These units should not be part of government but should be left to the private sector or NGOs. Initially, Government/Private/NGO partnership will be needed to develop local capability at the DHQ level. This also will use part of the RTDF outlay.

6.4.2 *Sources and applications of subsidies*

RTDF may also receive contribution from other sources as well. IFDF is foreseen as composed from various types of contributions. Workshop suggested that RTDF should contribute about 40% of RTDF to the activities to be carried out what is foreseen under IFDF. This will need to be determined in future by NTA, the new governing body and the government.

As far as the management of the Fund goes, there are advantages in using a bank as fund manager where a large subsidy is to be awarded through a competitive bidding process. But for smaller community projects, simple, flexible and accessible fund management is necessary. In rural Nepal, banks are not very accessible and are seen to be intimidating. PAF and RWSSFB both provide good examples of making disbursements through selected NGOs, who work closely with communities (both creating awareness of need and how it may be fulfilled, and providing technical support).

The Open Workshop, suggests rural telecom development funds to be utilised for creating network infrastructure, procurement and installation of end-user equipment, such as computers or fax machines, development of limited certain local ICT content and applications (both software and skills), in close collaboration with and complementing the bulk of such work, which should be done by other branches of Government or NGOs, and awareness raising; together with technical training where needed.

Assuming that available funds will not cover all calls on them, requests may be prioritised and subsidies calculated to favour:

- the least developed areas,
- the most marginalised groups (for example, groups led by women might qualify for a higher percentage subsidy)
- the highest development impact,
- the largest number of people reached and
- best value for money

while at the same time ensuring a reasonable geographic spread of beneficiaries.

Development impact may usefully be addressed in terms of expected contribution towards meeting the Millennium Development Goals Annex G outlines the goals, Nepal's progress towards them (which the UNDP found discouraging in 2002), and an approach to assessing how rural ICTs could support this progress, using the Poverty Reduction Strategy Paper Policy Matrix.

Detailed calculations on required subsidies will be carried out in the project, following the demand study. For the time being we offer the following approximate assessment of what may be needed and achieved.

We assume that NT's CDMA system (or similar) will be a cost-effective and economic way of providing service to all of the Terai area, most of the Hills, and main settlements in the Mountains. Left out from its coverage will be around 1,000 settlements (mainly in the Mountains, some in the Hills) with 200 to 500 population, each of which would be able to sustain the running costs of a VSAT installation but not the whole of its initial capital cost. These may therefore be suitable targets for subsidies of amounts up to around \$5,000 (the capital cost of a VSAT terminal), using a total subsidy of up to \$5m (over a 5-year period). This would leave still unreached a further 1,000 or so settlements in this size range which could not sustain the running costs of a VSAT installation, and maybe another 2,000 smaller settlements, accounting in all for around 2% of the total population. Most of these people will be able to use telephones located at a reasonable walking distance, even if not within "shouting distance".

Assuming that the market for Internet is given time to work, as proposed above, we would expect that the universal access targets (of public Internet access in selected RMCs by 2010) could largely be achieved within a subsidy budget of \$1m.

Other broad subsidy budgets (over a 5-year programme) could be, say:

- \$0.5m towards establishing more community radio stations
- \$0.5m towards initial costs of setting up PCOs where none exist
- \$1m contribution towards computers and Internet for schools (working with other agencies and funding sources)
- \$1m general fund for supporting a variety of community ICT access projects
- \$1m to contribute to content and applications development.

Note that the figures above are for actual subsidies and do not take account of administration costs. We recognise that the overhead in supporting many small projects will be proportionately larger than that in supporting fewer, larger projects.

7 Next steps in this project

7.1 The pilot project

There is a variety of possible ways in which the pilot project may contribute to a longer-term strategy like the one outlined above. For example:

- Demonstrating a variety of successful ICT development paths (such as some of the illustrations in Section 6.2, or others).
- Building awareness of ICTs and their applications in rural Nepal.
- Devising criteria to help the authorities to allocate limited subsidy funds fairly and appropriately among deserving projects.
- Producing initial working drafts of support materials for applicants for funds, as well as the procedures needed by people who are responsible for disbursing funds.
- Quantifying appropriate subsidy levels for different types of activity.
- Boosting ICT demand in certain areas, which will encourage non-subsidised provision of infrastructure.
- Piloting institutional structures.
- Testing certain business models or technologies.

These possible objectives are in roughly what we understand to be MOIC's current order of priority. Management capability is the stronger constraint than funding – the whole thing must be manageable by NTA with consultant support. It is therefore probably over-ambitious to aim to achieve all of these; in particular, we expect that the pilot will use proven technologies.

We have received several suggestions for pilot activities of different kinds in different places in Nepal. However, we believe that the first, over-riding objective – for a successful demonstration project – will be best served by focussing on a single connected area, preferably a chosen District or small group of (two or at most three) bordering Districts. This is for the following reasons:

- In a single area it will be easier to build awareness and capabilities. This will lead to a much better chance of sustainability. For example, a cluster of ICT installations may be maintained by a single locally-based engineer, and people responsible for public use and training can easily meet to share experiences.
- The demonstration effect will be much more powerful if people from all over Nepal can visit one area and see a variety of ICT applications operating.
- The District is the basic local government unit. A District-based pilot is best for our proposed approach of integrating planning for ICTs into the local development process.
- It is desirable to include in the pilot a variety of terrains, conditions and institutions, but these can be found within a single area.
- A focussed pilot project in a single area is more likely to be feasible in the difficult circumstances of a State of Emergency than a scattered set of projects.

We therefore propose that our pilot project should be focused on a single District, to be chosen using criteria such as:

- Reasonable accessibility and security (in the first instance for project staff, but also longer term for visitors to see the demonstration activities)
- Reasonable base level of ICT availability and awareness (for example, building on a previous telecentre project's community-based achievements)
- Local interest in hosting and participating in the pilot
- Variety of activities feasible, eg e-post or Internet to schools already planned.

This could be seen as a first pilot, to be followed by others elsewhere, perhaps becoming progressively larger with growing experience and improved security conditions.

7.2 The demand study

The demand study is scheduled for the next stage of the project. Here we briefly summarise some relevant evidence that is already available to us.

Demand for telephone service is widely recognised to greatly exceed supply. For example:

- Nepal Telecom holds waiting lists for connection. In all regions, waiting lists exceed 50% of actual lines, and in some places they exceed 100% of actual lines (the average waiting list is around 60% of actual lines).

- All prepaid mobile phone issues to date have sold out very rapidly.
- The recently published Living Standards Survey shows that nationally, only 10% of people in rural areas rate telephone facilities as adequate, while 34% rate them as bad (see Figure 15). In the mountains 62% rate the facilities as bad.
- The APT/SECEN study in 33 Districts found 40% of households wanting their own phone and 25% of households aiming to acquire one within the next year.
- The same APT study also gathered many comments on the shortage of lines. Some representative comments from PCO operators are reproduced in Figure 14 below.

Figure 14: Some comments from APT/SECEN PCO operator interviews

The telephone service is quite good but slight interruption sometimes. The line is so busy, people have to stay in queue sometime. Due to much busy in Saturday the service is quite disturbing sometimes.
Sometime people observed the transmission delay in the service. This line is generally busy. At Saturday, to have the phone call is very hard. The amplitude of sound is also very low.
Demand of the service is high, phone set doesn't work properly, usually suffer from noise. Daily may not be opened. No billing system. Taking price randomly.
Present situation one line is sufficient but in future they need more than 5 lines.
Telephone demand is very high (150 lines). So, they need sufficiently telephone line.
Sometimes line is disturb and not clear while weather is not so good.
They need 40 lines copper wire telephone and e services too.
Telephone lines demand is very high and we want internet, fax, photocopy service too.
With in few years a small rural exchange is expected in this VDC. NTC has already purposed for it.
Here is one line so busy and operating system also first sometime. So need a lot of telephone line for there.
Here only two line telephone that also should not regular so we want a lot of line for facilities for us.
PCO cannot be continued because of solar system in very cold & hot seasons.
PCO is closed due to insurgency till 2 years. It is good to start PCO as soon as possible because PCO is necessary for local people.

Figure 15: Opinion of adequacy of government telephone facilities²⁴

	Good %	Fair %	Bad %
Development region			
Eastern	19.8	58.2	22.1
Central	16.3	62.7	21.1
Western	10.7	55.9	33.4
Midwestern	8.1	43.5	48.4
Farwestern	12.5	49.3	38.2
Ecological zones			
Mountains	6.8	31.0	62.2
Hills	14.0	48.6	37.4
Terai	16.7	67.6	15.7
Urban			
Kathmandu Valley	42.6	56.0	1.4
Other	28.7	64.9	6.4

²⁴ Source: Nepal Living Standards Survey 2, CBS, December 2004

Rural	10.3	55.9	33.8
East Mts/Hills	10.7	44.1	45.3
West Mts/Hills	3.9	38.7	57.4
East Tarai	13.4	71.4	15.3
West Tarai	12.3	64.1	23.6
Consumption quintiles			
Poorest	8.8	62.5	28.7
Second	9.5	58.9	31.5
Third	9.4	56.2	34.5
Fourth	14.3	56.4	29.3
Richest	24.7	54.7	20.6
Nepal	14.9	57.1	28.0

Quantifying telephone demand is a challenge for the next stage. For the time being we are using a broad estimate of up to 30 NR per month per head, derived from NT's current revenues per line.

Rural Internet demand, by contrast, is low, and impossible to quantify at all closely. In Kathmandu there is approximately one Internet line per 10 telephone lines. For rural areas, we are working with estimates of one Internet line per 20 to 50 telephone lines.

8 Action plan

The Action Plan below highlights some major actions which are necessary in the foreseeable future to implement this strategy. It is not comprehensive. Many actions are addressed to bodies other than our client (MOIC/ NTA), and a first step must be for MOIC to ensure that everyone concerned is aware of and accepts their responsibilities.

The Action Plan includes time schedules for the following:

1. identified regulatory actions.
2. other central actions, including increasing use of ICT applications by central level (top level) government and coordinating functions to promote ICTs in rural areas.
3. implementation of telecom infrastructure programme to be achieved for rural telephone access by Nepal Telecom in particular, and the gaps to be addressed by NTA through needed subsidy.
4. implementation of public Internet access.
5. providing Internet access for schools.
6. setting up Community Radios.
7. establishing institutional requirements for implementing ICT access for rural and peri-urban communities.

Other necessary actions will be set out after further consideration, led by NTA initially and then by the institution being proposed under this study.

S.N.	Items to be implemented	Target dates	Involved Agencies
1.0	Policy and Regulatory Items		
1.1	Amendment of the Telecom Act 97 or changes in the current regulation to implement large part of new telecom policy	Mid May 2005	For Act - MOIC and for regulations - NTA and MOIC
1.2	Management of frequency for licensees of NTA to be commenced by NTA	Mid March 2005	MOIC and NTA
1.3	Wireless equipment (for NTA's licensees) import co-ordination function managed by NTA to be acceptable to customs authority	March 2005 end	MOIC and NTA
1.4	Making WiFi Bands in 2.4 and 5 MHz License Free	March 2005 end	MOIC
1.5	For Rural Internet waiving of License fee	May 2005 end	NTA/MOIC
1.6	Royalty for Internet and Community Radios to be decreased	June 2005	NTA/MOIC
1.7	Dial-up Internet access within a region at local rate.	April 2005	NTA and NT
1.8	Regulate the prices and conditions of supply of leased circuits, and interconnection for new telecom operators to be more effectively done	Commence immediately (March 2005)	NTA
1.9	Radio broadcasting regulation to be made transparent	June 2005	MOIC
1.10	Promote provision of optical fibres over the power grid and their use as leased circuits.	Commence immediately (March 2005)	NTA
2.0	Central actions		
2.1	Adopting ICTs in central Government, for example encouraging email communications between civil servants, and also with ordinary citizens	Commence immediately (March 2005)	MOST/HLCIT
2.2	Producing attractive and accessible development content (in local language and minimising literacy requirement)	Commence now (March 2005)	Ministries and line agencies
2.3	Providing good data connections among Nepalese universities, and linking them to external academic and research networks (for example, through the Asia-Pacific Advanced Network ²⁵ group).	By July 2006	Universities / MOST/HLCIT
2.4	Increase awareness for ICTs, Include topic related to ICTs in capacity building programmes for DDCs, VDCs and Municipal officials	Immediately (March 2005)	MOST/HLCIT/ New Institution/ other Ministries
2.5	DDCs , VDCs, and Municipalities to include ICTs in their participatory development programmes	By 2006	MLD/MOST/ MOIC/NTA
2.6	Implement E-governance to help citizens (rural and urban both)	Commence 2005	MOST/HLCIT/Ministries
3.0	Rural telecom infrastructure for telephones		
3.1	Nepal Telecom CDMA Network to have radio coverage of 81 percent of the population	By July 2007	NTA/ NT to review and monitor periodically to achieve targets
3.2	Nepal Telecom CDMA Network to have radio coverage of 95 percent of the population	By 2010	NTA/NT to monitor
3.3	Start process of Implementing trial projects for local infrastructure through small entrepreneurs in the district level	June 2005	Pilot Project
3.4	Preparations for and actual provision of phone infrastructure to fill gaps beyond July 2007, by creating access networks through appropriate technologies	By the end of 2006	NTA / New entity to implement universal access
3.5	Providing PCO with subsidy for settlements greater than 500, if within a year no commercial operation starts after radio coverage by CDMA	Commence installation by Dec 2006	NTA / New entity to implement universal access

²⁵ See <http://www.apan.net>

4.0	Internet Access		
4.1	Public Internet access for all district head quarters to be available	By July 2006	NTA to coordinate NTs work
4.2	Implement local dial-up for Internet within a region to provide customer choice of ISPs	By April 2005	NTA to arrange with Nepal Telecom
4.3	Assist in setting up regional Internet exchanges by NPIX	By July 2006	NTA/ISPAN
4.4	Identify rural market centres for staged provision of public Internet Access (2-6 per District)	End 2005 to 2008	First rounds of RMC by 2005 with DDCs help
4.5	Install public Internet access facilities in RMC not supported (at least one in each district) at least to cover 50% of population	Between 2006 and 2008	Districts to monitor and apply for needed subsidies
4.6	Complete public Internet access to identified 2-6 RMC in each district to cover at least 75% of population	By 2010	Districts/new agency to review targets and achievement periodically
5.0	Internet Access / Computers for Secondary Schools or Higher		
5.1	Provide computers to secondary schools or higher, for learning to use computers, wherever there is electricity supply and local competence and interest	By 2007	Support NGOs like COPPADES to accelerate this provision Through some subsidy work with MOE as well
5.2	Devise and implement further programme for computers and Internet to schools	By 2008	MOE/NGOs/new agency
6.0	Community Radio Stations		
6.1	Support establishment of community radios, at approximately 5 per year, to cover 90 % of the rural population	2005 to 2010	MOIC/NTA to work with other Donors and INGOs for their development and subsidy
7.0	Establish proper Governing Body for managing activities under RTDF and other subsidy for rural ICT access		
7.1	Amend the Act to institute a new governing body with membership from NTA and Ministries like MOIC, MLD, MOST etc.	By July 2006	MOIC
7.2	NTA to hire competent people to carry out all the activities until such body is functional. Meanwhile NTA should execute projects using RTDF and other donor funds for ICTs, with staff to be seconded	Until July 2007	NTA

ANNEXES

Annex A Selected community development paths in more detail

1. Computers in Schools

Type I – Demand based supply of locally assembled computers in a network and Internet/Email connections on the basis of some proposal/school evaluation system

Objectives:

- To prepare a new generation of ICT literate students who can later use ICT towards the development of rural & semi-urban areas and help in alleviating the poverty.
- To provide universal access of ICT to rural areas and lessen the digital divide.

Some salient features:

- In the first phase, beneficiaries will be 5 schools from each of the 75 districts with a total of 375 schools. Out of the 5 schools to be chosen from each district, 2 schools will be fully subsidized (H/W, S/W, training for the trainers, operation & maintenance etc.), 2 schools will be partially subsidized (operation & maintenance cost has to be borne by itself) and 1 school has to bear all the cost (except the overhead expenses of central administration).
- Schools with full subsidy and partial subsidy will have to pay the average overhead cost of central administration. However, schools without subsidy will not have to pay the overhead cost of central administration (incentive to go into this scheme for schools without any other subsidy saving on the cost of administration).
- All schools will receive 5 workstations with peer-to-peer networking, a printer, UPS/voltage stabilizer, suitable software & training CDROM each. It has been assumed that only 50% of setup will have internet access. However, one internal modem will be provided to all schools so that they can connect to ISP whenever accessible from the school.
- Two permanent teachers from each school will be sent for full time teachers training in computer for 2 months at regional training school as identified.
- Training to be provided to the teachers will have the following course content:
 - Introduction to computer system, general operation & management
 - Using Operating System
 - Using word processing, desktop publishing, spreadsheet and presentation applications
 - Using Internet, Email, Chatting, Webcam
 - Designing algorithms & programming
 - HTML/Java Scripting & designing web pages
 - First level operation and maintenance, electrical wiring, cabling & networking, virus scanning, cleaning etc.
 - Using computers as a tool in teaching other subjects
- All schools will place a demand to the project and schools will be selected on the basis of an evaluation system with set criteria. Schools with full subsidy must be from rural areas. All schools must be run by the local community. Schools must be willing to pay 50% of the total cost in advance and the remaining 50% in a six monthly basis in 4 instalments. All equipment will be the property of the school only after all instalments are paid.

- The central agency will be developing and/or procuring multimedia contents to be used by schools and will be developing web portal with reference materials to be used in schools
 - Target subjects: Maths, Science, English etc.
 - Target classes: Class VIII, IX, X
 - Subject wise Teachers Guide
 - Reference materials for students
- Central agency will identify the regional centers (champions) for training school teachers in computer education and for the maintenance support of computer & communication systems in the schools of their region. More than one center per region will be identified to make it competitive.
- Implementing Agency: Distance Education Center (DEC)? DOE? MOIC?
- The following are the tentative costs, revenue & gross profits to different category of schools:

	Cost	Expected revenue	P/L
○ Schools with full subsidy:	Rs 56,055	Rs 320,000	Rs 263,945
○ Schools with partial subsidy:	Rs 526,355	Rs 720,000	Rs 193,645
○ Schools without subsidy:	Rs 870,300	Rs 1,020,000	Rs 149,700

- Schools will be generating revenues from fees from schools students, fees from training the communities, desk top publishing, internet/email access etc.
- Gross profit (P/L) earned by each school with different subsidy schemes can be used for sustainability in the longer run.
- Type 1 project budget will be approximately NRs 190,545,000 (Equivalent USD of 2.7 Mil.).

Type II – Supporting organizations like COPPADES on the basis of minimum subsidy in bringing used computers from abroad

An additional budget of USD 300,000 to distribute second hand refurbished computers for 500 more schools. (as per the requirements in COPPADES proposal).

Total budget requirement for both Type I and Type II = USD 3 Mil.

2. Community Radio Stations

Objective of supporting Community Radio Development

The objective of supporting Community radio development is that it has proved a very powerful, effective and appropriate and cost-effective local medium for social and cultural development, poverty alleviation and empowering of rural people, especially disadvantaged groups and women, at relatively low cost. Community Radios could be made capable to access Internet and make information available to the people by answering queries received seeking information, which suites the aural society better, and also making the site double as a local telecentre.

These could be implemented with transmission powers of 50-100 watts, and in some cases about 200 watts. Partnerships can be established with other agencies who are good at training in programming, social mobilisation for participating in listeners clubs, and so on. Nepal

Federation of Environmental Journalists (NEFEJ) advise us that implementing about 5 units per annum is a reasonable goal. The Association of the Community Radios, a group nurtured by NEFEJ, can offer further guidance.

Coverage Area and Ownership and Organization

The example of Community Radio of Madan Pokhara helps to understand their functioning. Areas served by CR of Madan Pokhara have focused on 23 VDCs and one municipality but service covers to 65 VDCs. Estimated listeners of CRM are about 500,000. People's participation is extensive in Community Radio Madan Pokhara. General assembly comprises representatives of listeners, community and grassroots organizations, and professional organizations, friends of CRM, life-members, and Intellectuals. Board of Advisors includes expertise and visionaries of community communication, government officers related to communication, people's elected representatives and political parties. Management Board comprises Lifelong members and members elected by the General Assembly and belonging to the General Assembly. Large part of work force consists of part time volunteers. Broadcast programme consist of summary of news from the newspapers, local developmental news, discussion on local issues, views and awareness building items and songs and music.

Regulatory Problems of Community Radios

Regulatory problems to be addressed include lack of clear policy on community media and use of air-waves. The policy and regulations are required to be specific on regulations of air-waves, on differentiating Community Radio from Commercial Radio, on distinguishing the role of National and Local Broadcasting and on Public Service Broadcasting and Commercial Broadcasting. Non-transparent administration and high license and renewal fees are real headache and as such need to be improved. Recently a study to address the regulatory issues related to community radio development has been carried out by a committee created by the Ministry of Information and Communications, and recommendations have been submitted to improve on all the issues identified above.

The cost of establishing a Community Radio Station

Establishing community broadcasting capability is very low cost, because communities themselves provide much of the manpower required. For establishing a 100 watt FM Station, the basic infrastructure costs given by NEFEJ are below.

1. Radio Equipment cost including accessories

This would include transmitters (1+1) mode
and accessories

Rs.1,158,145

2. Studio Equipment

Rs 1,195,000

3. Electrical Equipment

Rs. 170,000

i. Generator (Honda)

ii. Wiring

iii. Air condition (for Tarai)

Rs.125,000

4. Earthling (Antenna Mast)

Rs 150,000

5. Installation

Rs. 175,000

Total

Rs 3,173,145

Alternative cost estimates:

- Approximate cost obtained from CRM was about 2,500,000 whereas from Lumbini radio figure obtained was Rs. 2,050,000 (500 watt + 100 watt standby)
- Figures obtained from Internet and estimated also gives about 1,650,000 for studio, transmitter, mast including one standby generator and installation of all. Say 1,700,000/- should be possible in some circumstances.

The training cost of 10 of stations, 12 persons from each together is calculated at about 250,000/-

Income of community radio

For first installation equipment is financed by money collected from the community as donation, contribution from VDCs, contributions from International agencies and NGOs. Community radios have established their association which is being supported by NEFEJ. This association is the means through which assistance could be channelled to appropriate new applicants for new Radio license or those interested. NEFEJ can guide, help and even obtain financial assistance.

Annex B Current RTDF documentation

The only legislation relating to the Rural Telecoms Development Fund is Section 30 of the Telecommunications Act 1997, which runs as follows.

To Develop, Expand and Operate the Telecommunications Service in the Directed Area:

(1) The Licensee pursuant to sub-sections (3) and (4) of Section 24 shall invest the prescribed percent of his total investment for the development, extension and operation of the Telecommunications Service in the rural area.

(2) The rural area, in which the Licensee is required to extend the Telecommunications Service pursuant to sub-section (1), shall be as mentioned in the License and in case it is not mentioned in the License, it shall be as specified by the Authority from time to time.

(3) If any Licensee, on the basis of mutual agreement, wishes to develop, extend and operate the Telecommunications Service to be developed, extended and operated by other Licensee pursuant to sub-section (1) and (2), the Authority may after making necessary inquiry, grant its approval.

(4) The Authority shall create a fund for the development, extension and operation of the Telecommunications Service in the rural area and the Licensee shall deposit such amount, every year, out of the annual income received by him as specified by the Authority.

(5) The Authority shall use the amount deposited in the fund pursuant to sub-section (4) for the development, extension and operation of the Telecommunications Service in the rural area subject to the policy of His Majesty's Government relating to the Telecommunications.

(6) The Authority may designate any Licensee for developing extending or operating the Telecommunications Service pursuant to sub-section (5) and such Licensee shall develop extend and operate the Telecommunications Service in the rural area as specified by the Authority.

* * *

The actual percentage of revenue to be contributed is specified in individual licenses. The current figure in all major licences is 2%.

NTA has kindly supplied to this project an internal draft document on RTDF management. A first English translation of this document (subject to correction) follows.

Overall objective

Based on the concept of decreasing regional imbalances by developing social, economic and physical infrastructure of the geographical regions, the objective of this policy is to provide reliable rural telephone and other telecommunications services to all the VDCs of the country in accordance with the Telecommunications Act 1997 by making provision for subsidies.

Policy objectives

To complete the process of providing telecommunication services accessible to rural settlements at shouting distance, as the minimum requirement, as soon as possible.

To make access available to suitable ICTs, as required by users' needs and capability to use them, for poverty alleviation and development of the rural areas.

To make access available for rural users to basic ICTs, like radio, television and telephone, which do not require special training and literacy.

To also employ the private sector in development and provision of telecommunications services in rural areas.

To employ small entrepreneurs in providing ICTS to rural areas.

To establish and operate Rural Telecommunication Development Fund to help in development and operation of telecommunication services in the rural areas in accordance with the Telecommunications Act 1997.

Need of the Policy

In order to meet above objective, a separate set of policies and rules are required to operate and use RTDF in a transparent manner.

Sources for the RTDF

All operators providing telecommunication services under licenses issued by the NTA shall contribute to this Fund, at the percentage determined by NTA of its total annual revenue.

Application of RTDF

The fund shall be applied to provide subsidy to the operator selected for providing telecommunication services to the unserved rural areas on the basis of minimum subsidy bidding.

Management of the Fund

A committee shall be created with members as given below, for determining the working policies of the Fund and for managing the activities related to tendering for developing, extending and providing telecommunication services in rural areas.

Chairman of NTA	Chairman
Officer from Accounting Unit	Member
Officer from Engineering Unit	Member
Officer from Rural Unit	Member
Officer working in administration of the Fund	Member secretary

The working procedures of the committee shall be as determined by the committee.

For carrying out activities related to administration of the Fund, one officer will be recruited by NTA or one officer working in NTA will be assigned with additional duties to perform this function as well.

Activities related to Administration of the Fund

To determine the rural areas where service is to be provided and submit an annual programme for the approval of NTA.

To select the successful operator.

To manage finance of the Fund through a Bank.

To carry out an audit of the activities under the Fund within six months of completion of the financial year, for transparency in application of the Fund.

Selection of the Rural Telecom Operator

The Fund Management Committee shall float tenders in accordance with the approved annual programme.

Tenders can be floated for use of subsidy in investment or operation of telecom services.

While applying for subsidy for investment, the basis of covering the maximum number of VDCs with a fixed amount of subsidy can also be used.

While applying for subsidy for investment, the bidder itself may be asked to provide a certain minimum percentage of investment.

The Fund management committee has to get approval from NTA for license fees, deposit amounts, bank guarantees and all other procedures related with the tendering.

The following basis shall be adopted in selection of operators by tendering:

Lowest subsidy per line, or

Maximum area coverage by service

Experience in running telecommunication service as specified

Having experienced human resources as specified

The subsidy shall be provided on commencement of operation by the service provider, in one go or in proportion to the areas which have successfully commenced service. The certification of completion shall be done either by staff of NTA, or by a group accompanied by a specialist employed for the purpose.

While making payments for investment, the operator has to submit a bank guarantee for the amount to be received by it and valid for the period specified by the Fund management committee.

The license fee and charges shall not exceed what is specified by NTA.

The operator has to obtain prior approval of the Fund management committee for changing the ownership of the operations constructed with the subsidy.

The selected operator has to obtain a license from NTA by paying the license fee as specified on recommendation of the Fund management committee.

The selected operator may be allowed to provide service on the recommendation of the Fund management committee in other rural areas also.

* * *

The 2003 Legal Report of the PS-2 Specialised Policy Advice Project for MOIC (by Teleplanning A. Wirzenius Ltd in co-operation with Bird and Bird) included the following proposed chapter for the new draft Telecommunications Regulation.

25 Operation of telecommunications service in rural area: An individual licensee has to utilize fifteen percent of his total investment in the development, expansion and operation of the telecommunications service in the rural area.

25A Rural Telecommunications Development Fund (RTDF)

(1) The RTDF shall be administered by an independent administrator who reports to the Board (Authority). Additional staff may be appointed as required. The salary etc. of the staff shall be at the level of comparable officers of the Authority.

(2) The Authority may appoint an Advisory Committee for the RTDF, consisting of representatives for rural users, Government administration for rural areas, the MOIC, telecommunications licensees, and other persons as relevant. The Advisory Committee shall annually approve a plan for use of the Fund. The plan shall be structured in projects for subsidising purposes. The Administrator shall submit the plan to the Chairman for final approval by the Authority.

(3) The cost of administration of the RTDF shall be covered from the Fund, including, but not restricted to, salaries, other cost, external experts for major planning projects, etc. Such cost shall be approved in the same manner as other costs of the Authority.

(4) The RTDF will receive contributions from licensees. The RTDF may also receive other contributions from HMG, donors, and other contributors.

(5) The funds of the RTDF shall be kept in a separate bank account, be reported separately in the annual report of the Authority, and be audited in connection to auditing the accounts of the Authority.

(6) Until and including 2009, for purposes of releasing funds for Universal Access, the minimum objective will be to extend coverage of voice telephone service to all VDCs.

(7) Until and including 2009, the annual plan mentioned in sub-rule (2) shall apply funds not less than 90 % for Universal Access and not more than 10 % for other relevant telecommunications services such as Internet.

(8) Funds for subsidising Universal Access may be used for improved telephone network coverage, and in particular, shall only be applied to subsidise the provision of voice telephony

in areas where there is no coverage. Funds for Universal Access shall not be used for subsidies of shared telephone connections, Public Call Offices, telecentres, etc.

(9) Funds for subsidising access to other telecommunications services may be used for network for providing Internet access and other services, and in exceptional cases for subsidising telephone connections for Public Call Offices, telecentres etc.

(10) In 2008, the purpose of application of the Fund shall be revised and this rule amended accordingly.

Annex C Alternative energy management in Nepal

1. **Meeting with AEPC:** Devendra Adhikari (Coordinator - Micro Hydro) & Mr. Saroj Rai (Coordinator- Solar (PV) Home systems). Mr Adhikari kindly agreed to read and comment on our proposals for managing ICT subsidies.
 - a. Purpose of our visit was to understand better as to how the AEPC is organized to deliver service and manage subsidies.
 - b. This was attended by Claire and Gajendra
 - c. Discussion was basically based on mechanism through which Subsidies are passed on for rural hydro schemes.
 - d. During the discussion he repeated several things which he had mentioned in the earlier meeting we had with him in September.
 - e. It is pertinent to recall that under ESAP (Danida) assistance, the subsidies can flow to private sector entrepreneur as well to communities for providing rural hydro schemes where grid is not likely to reach before the following 5 years of the project.
 - f. ESAP assistance and also REDP projects for micro- hydro was able to generate sizable private sector equipment suppliers, number of consultants to do preliminary feasibility and technical design and feasibility study of such schemes, and several contractors to build hydro – power plants. AEPC has prepared a list of pre-qualified consultants and contractors to work in the process.
 - g. AEPC works through local NGOs (area centre) in helping the rural communities to identify demand and suitable location for generation of power, and also assist during the project.
 - h. Feasibility studies are both technical (availability of suitable watercourse, etc) and economic (income-generation made possible by the electricity). Communities are expected to set their own tariffs, graduated so that even very poor households can afford to be connected. The revenues must cover running costs.
 - i. Guidelines for community mobilization demand generation (applications), training and maintenance are available in the AEPC to help deliver good successful results. We gather that 70 % of all applications selected for examination are successful in reaching the service delivery situation which stood at about 50% two years back. Availability of funds is not a problem – all applications that meet required standards can be funded.
 - j. The procedures developed and system working is very much functional and from application to completion of works and production takes 18 months in average. Preliminary feasibility studies costing about 20,000 NR per site are fully funded by AEPC, while detailed feasibility studies are subsidized by 30,000 NR each. Overall administration cost is around 20% of subsidies disbursed.
 - k. The subsidy is governed by the Policy and it is to the extent of 70% of the Total costs. Disbursement takes place: 40% down payment +40% during construction +10 on completion and start of service+ 10% after 1 year of maintenance period.
 - l. AEPC will have maps showing all the micro-hydro schemes working in 6 months and showing all potential sites in 2 years time.

- m. The vision is for a 10-15 year project, with funding commitments made for 5 years at a time. While most of the money is from donors, there is always a 10% HMG/N contribution.
 - n. Solar power has also sizable project but mainly home systems. This unit also provide solar to institutional purposes but very limited in number. Solar is generally a more expensive solution than micro-hydro and provides more limited amounts of energy. The overall lifetime cost of an installation may be reduced by using low-power-consuming equipment such as LCD screens, low wattage printers and power-smart computers, even if these are more expensive to start with.
2. **Meeting with EU unit** - which mainly is for solar power systems for institutional purposes.
- a. Persons met are: Mr. Cornelius Suchy (EU- Project Consultant) and Mr. Mangal Das Maharjan (Counter part)
 - b. The project is in very early stage and project and EU assistance is for until 2008.
 - c. The procedures followed by AEPC is more of community orientation (even more so in case of REDP case which is managed by a separate Project manager and has entirely based on community orientation: REDP's primary goal is poverty alleviation through use of alternative energy sources, whereas AEPC's primary goal is getting alternative energy sources into the field so that they can alleviate poverty)
 - d. The EU under AEPC is now trying to change the policy of procurement and implementation to suit the AEPC procedures in small scales, rather than as foreseen in the credit agreement document (large scale procurement by competitive bidding in EU countries).
 - e. The AEPC mechanism is to develop the sector capabilities at local as well as at national level for sustainability in longer term.
 - f. EU unit was very happy to see the likely hood of several projects which could go to institutions like schools, health post and community radios owned by the community as expected in our ICT project. After sorting out the procurement procedures, the project will help defray the cost of large sum required in ICT projects where hydro-power will not be available in rural areas. This will bring in lot of synergy in rapid implementation of ICT projects, as solar power constitutes a substantial cost while using a fairly large number of computers for school environment.
 - g. Because of delays in starting the project, whose life apparently cannot be extended, it may be difficult to disburse all the available funds quickly enough. So collaboration with ICT projects could help them as well as us.
3. **Meeting with REDP** (Rural Energy Development Project)
- a. Person met- Mr. Kiran Man Singh – Project Manager
 - b. Project Manger explained – project started in 1996 (UNDP assisted)
 - c. This has large component in micro-hydro schemes (now World Bank component of Power development fund is also included since 2003)
 - d. The micro-hydro schemes are owned by entire community and power is made available to entire community. Even very poor have ownership and if they cannot afford to use it at normal price the rest of the population is to subsidize them

- e. Project is overseen during preliminary study, design and supervision, through all phases by DDC level unit power development unit- supported by REDP eventually to build up the capability in all DDC level. Together with ESAP/AEPC now REDP /AEPC will have all 75 districts covered. AEPC/ESAP programmes are also now moving towards more community ownership direction.
- f. The question of how long it will take to provide electricity to all of rural Nepal is still not answered. In spite of all these efforts, at prevailing rates of progress it would take decades.

Annex D Pro-poor media action plan

This major report by Media Service International (MSI) for the DFID-funded Enabling State Programme (ESP) was published in May 2003 and runs to 89 pages.

Its main focus is the inadequacy of pro-poor content in existing mainstream media. Its recommendations are mainly designed to strengthen other, appropriate media which will both provide poor people with content that may help improve their situations, and enable these same people to produce their own content.

It contains information on 18 types of media in Nepal, which are listed below. The ones that are closely associated with electronic ICTs are highlighted in **bold type**.

- 1 **Community radio**
- 2 **Private radio stations**
- 3 **Radio Nepal**
- 4 **Nepal Television**
- 5 **Channel Nepal**
- 6 **New private stations**
- 7 **Local cable TV**
- 8 **Community audio towers**
- 9 **Community telecentres**
- 10 **Audio cassette magazines**
- 11 Regional/district newspapers
- 12 Community/rural newspapers
- 13 Wall newspapers
- 14 **Feature services**
- 15 Street drama
- 16 **Readers and listeners clubs**
- 17 Public hearings
- 18 **Participatory videos**

Radio now has very wide reach in Nepal: Radio Nepal is estimated to be received by 80% of households. The number of local and regional radio stations is growing rapidly, and is now over 50, with 18 of these regarded as community radio stations.

Television is less widespread but also growing. Nepal Television reaches about 55% of the population. Cable television (where signals received on a satellite dish are distributed around a town for a modest subscription) is estimated to be available in around 750 localities.

The report provides recommendations for intervention in the following nine areas over 4 years. Again, those closely involving electronic ICTs are highlighted in bold.

1. **Community radio**
2. Alternative community media
3. **Community telecentres**

4. Regional press
5. Advocacy and research
- 6. Community communication support centres**
7. Pro-poor media organizations
- 8. Audience clubs**
- 9. Local cable TV**

The most important recommendations in these areas (from the standpoint of our project) are reproduced below.

Community radio

- Establish 12 model community radio stations by providing counselling, legal support, technical support, hardware and equipment, training, and maintenance and emergency support
- Provide hardware and equipment support to 12 community radio stations.
- Conceptual trainings on concept of pro-poor and community communication and journalism.
- Professional and technical training on radio journalism and operating production and broadcasting equipment.
- Emergency support fund to pay for equipment repairs and replacement.

Community telecentres

- Establish 5 model community telecentres (one per development region).
- Provide technical and management training to telecentre staff.
- Provide hardware support to telecentres.
- Provide other support to establish and operate these telecentres, by paying for telephone connection and charges for four years.

Community communication support centres

- Establish five CCSCs.
- Provide production equipment and facilities including audio and audiovisual studios, desktop publishing units and internet facilities.
- Fund digital networking, including V-SAT rental, up- and down-linking facilities, power backups, training for technicians, and maintenance and operation costs.
- Fund all CCSC operational costs including house rent, telephone, electricity, and water for five centres for 4 years.

Annex E APT study recommendations on multipurpose telecenters

Applicability of Data Mining Tools for forecasting prospects of e-technology integration at the Multi-Purpose Community Telecenter (MCT)

Report by Society of Electronics and Communication Engineers, Nepal (SECEN) for Asia-Pacific Telecommunity (APT), August 2004

16. Recommendations

16.1 Major

16.1.1 Audio-Visuals & Documentaries

- As the rural communities are mostly ‘listen-talk’ communities, and not ‘read-write’ communities, making audio-visuals and documentaries that transmit the failure stories and the success stories would be very effective.
- To whatever extent it is ‘generic’, the advantages of viewing such a production featuring all aspects of MCT would make tremendous effect, particularly, to the rural population in comparison to the effect of community discussions &/or organized orientation programs.
- The productions should not focus on a single MCT, but should contain numerous examples (or, cases) that are not restricted by cultures, languages, races, color, or topography. This is particularly important to give the feeling to the viewers that the subjects (or, cases) have a lot of similarities to their specific understanding and requirements.

16.1.2 Tele-center Workshop

- Inter-governmental organizations like APT should organize “Tele-center Workshop” with focus on the sustainability issues of MCTs. The workshop should gather efforts of APT member countries to discuss recommendations made in this report as well as other reports or policy recommendations by other organizations and study groups.
- The regional workshops can promote ‘Regional Thinking’ to bridge the digital divide. Efforts to bridge the divide require an urgent collaborative response from the international community.

16.2 General

16.2.1 Pre-Telecenter Study

- As an increasing number of pilot Telecenters are being made operational before any real baseline data has been collected on the communities they serve, “pre-Telecenter” data should be collected and documented before any new establishments. This should be used later to analyze effect of Telecenter to the targeted communities (or users) after introduction of the services.

16.2.2 UNESCO’s Publication on MCT

- The publication titled “TEN STEPS for Establishing a Sustainable Multipurpose Community Telecenter” by Gail Short and Deborah Rice could be an invaluable reference. According to the publication, it is intended to assist communities to walk through the basic requirements that should be addressed when setting out to open and operate successful MCT.

- This is a wonderful publication containing such minute information like desired abilities of applicants for Center Manager, sample formats for notices and advertisements related to MCT, formats for payment vouchers of petty cash in the MCT, and even samples on how to propose a budget for MCT.

16.2.3 Role of Local Initiatives, Community Participation and interaction

- MCTs should reflect the needs of the people and should be initiated from within the community or prospective users, rather than imposed from outside.
- It is important that people hear about the new venture (i.e. MCT) early so that ownership is felt by the whole community.
- MCT is not a capsule solution for poverty reduction. The MCT program must be adjusted to the actual need of the people, and developed according to the interest and capacity of the people.
- Knowledge should be provided free to the community whenever possible.
- There should be regular interaction between the facilitators in order to develop confidence about the technology and business models being used or under consideration.
- MCT should provide meeting space for small groups which is very useful way of bringing people into the center, and for promoting services that are offered. After some time, the center can become a place where everybody of the community has some reasons to visit.
- Participatory approach in comprehending and solving their problems should be encouraged.

16.2.4 Support existing institutions

- If there are shops/centers that are already using equipments comparable to the ones in the MCTs, then they should be trained to make them more efficient, rather than to begin establishing 'efficient centers' from scratch.

16.2.5 Collaboration with local institutions

- Collaborate with local schools to provide ICT education to the students who will be "computer-literate" customers of the center in near future.
- As seen in Laos, the school with computer lab (or going to have computer lab) should be considered as a place for computer education and training even to the local people working in nearby offices.

16.2.6 Ownership

- The location & custodian of the center should be decided locally with preference given to the one that is already operating PCO, or the one that has financial activities for the target community.
- A Telecenter can be community owned and managed, or sponsored by an agency, etc. They are more attractive to those entrepreneurs who are already providing some sort of ICT services.

16.2.7 Location (Collocation) of MCT

- As found in the data analysis, efforts for establishing MCTs should consider School, Health Center, PCO and VDC office as possible locations for MCTs.

- Collocation with other community groups and facilities is possible, and should actually be encouraged. It helps the MCT to be sustainable as it saves money in different ways like sharing of facilities & equipments, load-sharing among staffs, increasing the service time, etc.

16.2.8 Target users & role of income

- MCT needs to cater for all age groups, interests, and ability levels. If people are happy, they will come back to the center and the center may prosper.
- As found by other research, Internet access is not distributed randomly among the population, but it is correlated strongly with income and education. As such, introduction of income generation skills would help to increase computer access, which will, in turn, enhance Internet use.

16.2.9 Clear, Documented Rules & Regulations

- There should be mechanism for making legislation, forming user groups, and mobilizing resources for implementing MCT according to the applicable local, national and international laws.
- Countries should have policies that encourage all workers to be computer literate. The literacy program should be launched as a national campaign once the infrastructure is established.

16.2.10 Role of Government & Non-profit organizations

- As the commercial sustainability is not so attractive to private sector investors, the government, and non-profit making organizations have to take special interest on MCT.
- Similarly, telephone service providers are unwilling to invest in installing telephones in unprofitable rural areas, thereby leading to scarcity of telecommunication services and contributing to the digital divide.
- The telecommunications regulatory authorities should help to create a congenial environment for private and public sector operators to survive and grow, by setting transparent standards.
- The local rural communities cannot do Planning, Investment, Implementation, Testing, etc., and so the government institutions must play their role.

16.2.11 Regulatory & Legal requirements

- All efforts must comply with legal requirements of each country and with the programs & service of each individual community.
- The main responsible committee must find out, understand and follow the legal requirements to register the MCT, and its anticipated services, and also about tax laws and financial regulations.
- Taking permissions, registrations and licenses for technology used in the center should be done in advance to avoid last minute harassments (See: Jhai Foundation Initiatives, Laos)

16.2.12 Overcoming Inertia

- Mostly in underdeveloped countries, the government side and the business sectors are making little use of ICT services including email and the Internet. It appears that there is an insufficient understanding of the benefits and the potential of the Internet.
- Although the ICT sector is undergoing extremely rapid change, and government run bodies have a natural inertia that is often much slower than that of autonomous or privately funded organizations.

16.2.13 Need of “national entity” for ICT

- The entity should maintain contact with the full range of stakeholders, and it should be politically robust and well situated closely to the central policy making arm of the government.
- The entity must have adequate resources. It should reflect a public/private sector and sector/community partnership, and also have political accountability, and a legal and fiscal status.
- Various experts, ministries, universities, industries, professional organizations, training institutes, business houses and other relevant agencies are envisaged to represent the entity.

16.2.14 Investment on ICT-HRD

- Although many governments raise revenue through taxes on ICT, the investment on ICTHRD is almost non-existent in most countries. At the national level, lack of adequate funding in ICT training is associated with lack of knowledge of the potential of ICT in national development.

16.2.15 Cost Factor and Purpose of Funds

- Cost study is vital in every project for sustainability. Sharing of necessary facilities at the rural Telecenters is the most cost effective solution.
- Low cost PCs, low cost Internet connection and telephone lines are the basic requirements.
- Local funding should be encouraged in order to facilitate continuity of the program. External fund should be used for special equipments, vehicles, study tours, etc., and not to complement cost of operating the center.
- As the “non-revenue-generating” incoming calls consume a lot of resources of the center at the expense of “revenue-generating” outgoing calls, there must be some defined compensation measures for the incoming calls.

16.2.16 Technology Options

- The local information need should be analyzed before deciding on the possible technologies.
- The chosen technology should be appropriate, inexpensive, and at the same time robust and highly reliable. The possible technologies for future are suggested by the technologies that are available at present. Choosing unreliable technologies and putting ‘Out-of-order’ notices at the center will be tolerated occasionally but not regularly.
- Providing voice over IP service is prohibited or may require proper licenses from the government in many countries, but may become widespread in near future mainly due to cost factor.
- Narrowband Telecenter should not be ignored as these are essential to have access to information in remote areas.

16.2.17 e-Technology services

- e-Technologies, e-news, e-mail, e-application, etc. that do not involve money may be integrated into MCTs from the start.
- e-commerce may be delayed in underdeveloped countries until supporting infrastructures like secure payment mechanisms and dependable delivery systems are non-existent.

16.2.18 Equipments in the Telecenter

- There is no single, standard equipment list for a Telecenter, and so they should be customized as per the requirements of the community they will serve.
- MCTs start with the basic equipment and then as their income increases, they purchase equipment to address needs identified in their community.

16.2.19 Promote ‘Off-line MCT’

- In places where telecom system is not capable of handling data, or where a full fledged MCT is not feasible technically or financially, then those places should be introduced with partial features of MCT. Initially, the startup could be simple voice communication, then add offline equipments like photocopier, etc, then fax, before introducing Internet & email services. In addition, this can play a commendable role for smoother transition to a fully functional MCT as soon as the telephone system gets upgraded with data capable equipment.

16.2.20 Service Provisioning

- MCT’s should not duplicate existing services, but they should always try to complement, restore and initiate programs and services which are not currently available (except for the basic services like email, Internet & fax) which will be required to support all activities within the center.
- Promote the use of ICT in the non-ICT sector which will increase awareness across all levels, initially at least, in the private sector.
- Although MCT may be considered as a ‘Technology Hub’, the center should be promoted as the place where “just a little technology” enhances the social and cultural activities.
- MCT should also provide additional services that the community expects and that can support the MCT in some way financially or otherwise, although that has nothing to do with ICT, for example:
 - give access to forms and information, assist people to fill in the forms and then send those back to the relevant organization
 - organize some programs, or make MCT an interesting place to be where lots of activities take place
 - apart from training on computers and Internet, MCT should also provide other courses like agricultural information, professional development, web page design, desktop publishing, first aid training, emergency training, safety training, etc.

16.2.21 Self-assessment

- Self assessment of the community in terms of its capabilities and resources is important for content generation. Self assessment must be done and documented, before trying to learn similar things from outside of the community.

16.2.22 Role & selection of MCT staffs

- the staffs should consult the community so that they will feel important and happy
- try to involve the disadvantaged people such as financially disadvantaged, the aged, people speaking other languages, women, etc.
- according to [UNESCO], as Words of Wisdom, “There is no one who cares more for the community than someone who lives there.”

- The Manager of center should be the one who knows and understands the community and its needs, has an acceptable level of technology skills, can handle money and above all talk to people and make them feel comfortable in this new technology environment.

16.2.24 Role of School Teachers

- teachers will have to be convinced of the value of using ICT because the learners cannot be expected to become adept at new technologies if the teachers do not fully appreciate the potential of these technologies

16.2.25 No free service but encouragements & benefits

- although run by the community and for the community, giving the services ‘free’ is not recommended in community efforts like MCT
- not giving free services creates a sense of belonging/ contributing
- fees must be charged (at least subsidized) for the programs and services that are offered from MCTs
- there should, however, be some encouragements and promotional offers in the form of free access to email for the first month, free training in a relevant course of study, or returning of a few months membership fee for some conditions (e.g. to members who are regular in paying membership fees), or other schemes like ‘three members of the same family at the price of two’, etc.)

16.2.26 PC on Installments

- The financially capable institutions of underdeveloped countries should establish a system to provide PCs, Laptops bundled with Internet accesses on installment basis, as done normally for purchasing vehicles, owning land or making a house. If a mechanism could be developed, then this would help generate more opportunities for ICT penetration.
- For example, if somebody gets this facility, then if this is the first machine they have owned at home, then they would use it, and if this is the second one, then most probably they will be interested to sell the earlier one, making it possible for the other household that decides to own a second-hand PC at affordable price. As such, the positive feedback that would be generated by “PC on Installment” would definitely help a lot in the developing countries to minimize the digital divide.

17. The Future Work

As issues of network reliability and quality of service continue to be of considerable interest to developing countries, the focus on management issue, marketing technique and strategic partnership are getting more important. Applied research and the transfer of technological knowhow will be an indispensable part of the task of expediting the access to new technologies on a non-discriminatory basis for developing countries and countries with economies in transition.

This project does not include sociological implications on the analysis made. In the same way, the cumulative effect of linear effects is completely ignored in the study. Further analysis of these findings from historical, social, psychological perspectives is recommended to be performed with a simple assumption that MCTs are not only technological centers, but they are the promoters for social interaction and cultural exchanges. It is felt that the findings should also be interpreted by a sociologist or an economist as a complement to technical analysis.

The research part of this study was based the use of Data Mining tools on survey data, and produced interesting findings. Another step as a further research should use the same tool on operational data of

MCTs in different countries and contexts. This would, hopefully, provide more insight to the success and failure of MCTs, and suggest strategy for sustainability.

Further research should try to determine the ideal size of population that could be served by a single MCT. This should also include search for other parameters that could determine success factors and sustainability issues.

Based on findings in this research, motto should be as follows:

*Provide “orientation” to “students”, “training” to “ICT teachers”,
“encouragement” to “early-adopters”, “promotional-offers” to “enthusiasts”,
and “support” to “PCO/MCT user groups”.*

Annex F Information and Communications Technologies in Rural Nepal - enhancing access and services delivery

Part of the Final Report of the 2003 World Bank funded Specialised Policy Advice project (PS-2) for MOIC, November 2003, Teleplanning A Wirzenius Ltd.

This volume may be seen as a direct forerunner to the current project. Although in some respects its contents now need updating, for the most part they remain current and relevant. We therefore provide below some of its key findings and conclusions.

Choice of Information and Communication Technologies

Compared with end-users, the staff involved in service provision are relatively few and relatively well-educated. They can therefore benefit more easily from Internet and e-mail. Improved ICTs for these staff will lead to improved service provision and will ultimately benefit end-users.

In the context of Nepal, vital points to take into account in choosing the right ICTs for rural end-users to use directly include:

- Actual availability. Nearly half of rural Nepalese households already have a radio set, while less than 1% have a telephone.
- Low cost, together with suitability for shared use, which further reduces cost.
- Usability by people with little or no education. Internet requires a high level of literacy, which is probably possessed by fewer than 5% of Nepal's population.
- The target audience for the specific application, the importance of the application to them and the frequency with which they use it

All these considerations point to the broadcast ICTs (radio and television) being more suitable than Internet in the short and medium term for reaching most rural people directly for most applications.

Lessons from international experience

There is now a great deal of specific experience available of rural ICT projects in developing countries – much of it published, and much more which can be obtained through skilled individuals with hands-on experience.

Successful rural ICT projects, like any other projects, need to be well managed. Among other things, this means careful planning, local support and preferably local leadership, co-ordination and integration with other projects, properly trained staff and adequate resources.

Novelty and glamour have sometimes led to ICT applications being "over-hyped" and pursued for their own sake. But for the most part, ICT is valuable as a development tool rather than as an end in itself.

Internet has become an essential part of nearly all development projects, with huge benefits in both efficiency and effectiveness. The question is not "Can the project afford Internet access?" but "Can the project afford to proceed without Internet access?"

Where rural people have direct access to ICTs, people who benefit the most tend to be younger and better educated.

Conclusions relating specifically to rural telecentres include:

- Sustainability of rural multipurpose telecentres presents a major challenge. Telephony is well used, but often there is little demand for more advanced services, especially if they are priced at a commercially realistic level. The location of rural telecentres is critical. They are much more likely to be used in places that many people have to visit anyway for other reasons, such as a market. A less busy location like a school (out of hours) may be more spacious and pleasant, but still less used.
- Another critical success factor is the involvement of local people in deciding details like the services to be supplied by their telecentre (e.g. should it have a photocopier?), opening times and charges.
- A "cluster" of telecentres in a small area, enabling staff to share problems and experiences supports the success of each individual telecentre.

Current developments in Nepal

The Figure below illustrates some major current and planned uses of electronic ICTs for rural service delivery that we have become aware of. It is not comprehensive.

Education	Computers provided to 100-150 secondary schools. Primary teacher training uses daily radio broadcasts. Plans for Open University within 3 years using broadcasts.
Health	Regular radio broadcasts. Healthnet online database for professionals.
Agricultural advice	Regular radio broadcasts. Online access to market prices.
Postal service	Plans for e-post between 18 Post Offices in 5 years.
Official certificates etc	Mainstay of "e-governance" pilot projects – telecentres being installed in 9 municipalities and 8 rural market centres, plan to extend to 33. Land records computerised in one District.
Planning, general	Computers now in all District Headquarters for general development, health, education; some are linked to Internet. Geographic Information Systems producing detailed maps using bottom-up data in Kathmandu and several Districts. Successful community radio stations in a few places. Satellite radios working in 38 VDCs. Rural telecentre pilot project – 2 out of initial 15 are (near) operational, plan for 1500 to follow.

We observe that there is quite a lot of relevant activity, but little co-ordination and no overall planning for provision of electronic ICTs for rural service delivery. Facilities provided do not necessarily match priority needs.

Key findings

Given Nepal's difficult terrain, electronic ICTs have a very important contribution to make to its economic development. But they need to be introduced with specific applications in mind and as part of properly managed projects, not as ends in themselves.

It is important to choose carefully the best ICT for any given application from the wide choice available. Indirect applications of ICTs (that is, those used by professional staff rather than by rural people themselves) may often be a cost-effective way of improving rural service delivery.

The postal service is the only two-way communications service available to the vast majority of rural people. It is especially important given the large number of migrant workers and their need for money transmission. However, postal services are generally slow, inefficient and running at a large loss.

Despite having many shared objectives, the various current projects have little mutual contact. Co-ordination and co-operation will be highly beneficial. The lessons available from pilot projects must be shared before larger commitments are made.

Conditions vary widely among different Districts. Bottom-up participatory planning will be essential to ensure that the ICTs provided suit local conditions. Top-down planning by outsiders without local consultation may well lead to expensive mistakes.

Although our focus is rural development, locating early telecentres in towns may be a good way to reach rural people. Rural market centres are particularly promising locations because many rural people visit them regularly.

The lack of power infrastructure is a major obstacle to providing rural ICTs. Solar power may be used, but it greatly increases the cost of any installation.

The take-up of computers and the Internet by Departments of central Government is very patchy. General use of these tools by central Government is a prerequisite for their effective use in rural service delivery (whether indirect or direct). It is also a major step towards more open governance.

Main objectives

If the proposals in the main part of the PS-2 project are implemented, then over half the population will be within mobile phone coverage by 2006, and a few hundreds of public Internet access points will have been provided in conjunction with mobile base stations.

In that case, we expect that the proposed approach will lead in the next five years to a situation in which:

- Almost everybody in Nepal can listen to the radio, watch television and make and receive phonecalls (or text messages) on a daily basis.
- Most people who are sufficiently educated to use computers and the Internet themselves will be able to do so by travelling to a town for which they have other reasons to visit (say, on a weekly basis).

- All District Headquarter towns, and in more advanced Districts several towns, will have multipurpose community telecentres where qualified staff will help anyone who needs help to use a computer or the Internet.
- All agencies of government with responsibilities for service delivery to rural areas will be in a position to take advantage of these new access possibilities. They will use the networks to communicate with their own staff and with the public. They will be producing appropriate content to support service delivery, mainly for broadcasting but also, increasingly, for computer and Internet distribution.

Proposed actions: ICTs for rural end-users

Enable local communities to assess the full range of ICTs available to them (for example, by training officials and providing illustrative materials for Community Organisations). Encourage all Districts to include an informed assessment of ICT requirements in their development plans. Support the fulfilment of these plans by providing facilities, equipment, training and personnel where needed to complement those that become available commercially. Supply external matched funding in more favourable ratios to projects that cater for disadvantaged groups.

Include planning for publicly accessible phone and Internet service in Rural Market Centre development plans. An achievable target may be to reach 150 rural market centres by 2005.

By the end of 2007, ensure virtually universal access to national radio and television broadcasts (using satellite transmission where terrestrial coverage is uneconomic, and providing publicly accessible television sets and radio receivers in all VDCs). Give high priority to producing programmes which will inform people on development issues while remaining attractive. Foster the development of local and community radio and television stations, which will carry these national programmes as well as locally-produced material.

Provide training for telecentre staff (including “Internet scribe” skills where needed). They and others will be supported to carry out community awareness campaigns, designed to help rural people to understand and make the most of the facilities that are being provided locally.

Remove any obstacles to private enterprise providing publicly accessible ICT facilities on a commercial basis. Consider positive incentives, such as loans to enable under-employed youths to buy computers.

Plan to provide e-post and secure electronic funds transmission at all Post Offices in places where power supply and telephone connections are available, and where premises are suitable. Following a pilot project to identify and resolve practical problems, all Post Offices that already satisfy these criteria should provide these services by 2005. After that, other Post Offices should be connected progressively to the e-post network when power supply and telephone connections arrive nearby. In some cases, e-post may justify special provision of these services to remote areas.

Proposed actions: ICTs for rural development professionals

Under a single Ministry with overall responsibility for information and communications infrastructure, build the strength and capabilities of the National Information Technology Centre (NITC), to enable it to become the focal point for co-ordination, planning and support

for all development projects using ICTs. It will ensure co-ordination with the rural electrification programme and with the rollout of fixed and mobile telephone networks. It will encourage outside investment in ICT projects by assisting choices of ICTs that are appropriate to local conditions, and facilitating sharing of what is provided among different Government Departments and different projects. An essential tool for this will be an up-to-date, publicly available database of all such projects. NITC will also run a library of appropriate content, which can be made available in different formats as required (e.g. on CD-ROM as well as over the Internet, enabling stand-alone computers to use the material).

Proposed actions: all ICT applications

Connect all Departments of central Government to the Internet. By the end of 2004, all Departments will provide informative websites including all important published documents. By the end of year 2005, in those Departments with responsibilities for service delivery to end-users (e.g. Agriculture, Health, Education, Post), all staff whose jobs require completion of secondary education (or above) will be Internet- and e-mail-literate and will use e-mail for internal and external communications. This is necessary both to provide open Government, and to facilitate the use of Internet and e-mail by rural development projects.

Set up local ICT co-ordinating committees in Districts, including representatives of the VDCs, the various Government offices, NGOs active in the area, private entrepreneurs and any other interested parties. These committees will be responsible for liaison both within the District and with central Government, with the aim of ensuring both appropriate local ICT provision and the fullest possible exploitation of what is provided.

Annex G Rural ICTs and the Millennium Development Goals

The table below, taken from *Millennium Development Goals Progress Report 2002 - An agenda for Action, an Agenda for Partnership*²⁶, published by the United Nations Country Team of Nepal, shows that Nepal is not yet on track to achieve any Millennium Development Goal except one relating to safe drinking water. These are targets that the world's leaders set at the Millennium Summit in September 2000 to reduce poverty in all its dimensions and manifestations. Through specific baselines and numerical targets, the report offers a chance to examine achievements, to identify shortfalls, and to indicate priority areas for development assistance.

Millennium Development Goal (MDG)	Will MDG be met?	Environment	1990 indicator	2000 indicator	2015 goal
Extreme poverty: halve the proportion of people living below the national poverty line	Unlikely	Weak	42	38	21
Hunger: halve the proportion of people who suffer from hunger	Unlikely	Weak	49	47	24.5
Universal primary education: ensure that by 2015 children everywhere, boys and girls alike, will be able to complete a full course of primary schooling	Unlikely	Fair	64 38	72 45	100 100
Gender equity: achieve equal access for boys and girls to primary and secondary schooling by 2005	Unlikely	Weak but improving	56 41	78 71 65	100 100 100
Child mortality: reduce under-five mortality by two-thirds by 2015	Potentially	Fair	162	91	54
Maternal health: reduce maternal mortality ratio by three-quarters by 2015	Unlikely	Weak but improving	850	539	213
HIV/AIDS: halt and reverse the spread of HIV/AIDS by 2015	Unlikely	Weak but improving	24	39	100
Malaria and other major diseases: halt and reverse the incidence of malaria and other diseases by 2015	Unlikely	Weak	115	29	-
Environmental resources: reverse loss of environmental resources	Lack of data	Weak	11	18	?
Access to safe drinking water: halve the proportion of people without access to safe drinking water	Probably	Strong	54	20	21

Meeting the Millennium Development Goals is addressed in Nepal through the five-year planning process, currently documented in the Tenth Plan (2002-2007) Poverty Reduction Strategy Paper (PRSP)²⁷. The paper provides a Policy Matrix that could be used to map ICT initiatives onto PRSP targets. Areas such as agriculture, education and health are prioritized, and could especially benefit from the deployment of rural ICTs.

²⁶ Sources: <http://www.un.org.np/publications/mdg/> (Nepali), <http://www.undp.org/mdg/countryreports.html#Nepal> (English); figures are from District Development Profile of Nepal 2004 (Informal Sector Research and Study Centre).

²⁷ <http://poverty.worldbank.org/prsp/country/122/>

Annex H Some material on Uganda's use of its RTDF

From the Uganda Communications Commission (UCC) website

RURAL COMMUNICATIONS

The development of rural communications is of great importance to UCC. Operators have been required, directly through the licence rollout obligations, to attend to rural communication development. UCC has set up and manages the Rural Communications Development Fund (RCDF). The fund, while limited, will be used to leverage investment in rural communications through competitive private sector bidding.

The Commission also hopes to encourage:

- Policy conducive to rural telecommunications development;
- Technology choices appropriate for rural areas;
- Models for serving rural and isolated communities;
- Financial tools for rural telecommunications development and expansion.

Uganda Communications Commission (UCC) adopted a Rural Communications Development Policy ([PDF Format](#)) in July 2001.

Mission of the Policy

The Mission of the policy is "to support the development of communications infrastructure in rural Uganda and ensure that people in rural areas have reasonable and affordable access to communications services".

Objectives of the Policy

- Bring access to basic communications to all sub-county levels in Uganda or to every community, which has a population of at least 5,000 inhabitants, by the year 2005
- Ensure effective utilization of the Rural Communication Development Fund (RCDF) for Rural Communications Development;
- Promote Information and Communication Technologies (ICT) use in Uganda;
- Promote communications in rural areas as a profitable business.

ICT Component of the ERT Project

The Government of Uganda and the World Bank agreed to the incorporation of an Information & Communication Technologies (ICT) component into the Energy for Rural Transformation (ERT) project. The ICT component will provide seed finance to accelerate the achievement of the UCC's rural access objectives. In line with international best practice, the UCC plans to competitively tender the provision of ICT infrastructure in unserved areas to private sector operators on the basis of minimum subsidy bids.

The ICT component will finance the investment subsidy required to induce private operators to provide basic voice telephony and Internet access facilities in regions of the country where these services are socially desirable yet demonstrably not viable for ordinary commercial operation.

The ICT component will also provide Technical Assistance to ensure that the design of the rural projects is in line with international best practice and that the tendering of the projects is conducted in a transparent and arm's length manner.

The tendering process for the provision of ICT infrastructure started with the specifications and implementation studies which are currently on-going. Invitation for prequalification bidders was done in March 2004.

RCDF PROJECTS

The Commission in August 2002 decided to implement some start-up projects in the areas of Voice telephony, Internet cafes, Internet Points of Presence, ICT training and Content creation.

The lots as here below were advertised in the months of September-November 2002.

- Lot 1: Public pay phones
 - 20 locations in Eastern Region
 - 20 locations in Central Region
 - 30 locations in Western Region
- Lot 2: Internet Points of Presence (26 districts)
- Lot 3: Internet Cafes (26 districts)
- Lot 4: ICT Training in one Vanguard Institution (26 districts)
- Lot 5: IT Content creation

UCC later on held a half-day workshop on the 25 October 2002 at Grand Imperial Hotel to sensitize intending bidders on what was expected in their proposals.

Successful Bidders

Each successful bidder received a subsidy amount ranging from 30 to 50 percent of the investment costs with exception of IT Content Development that is fully financed by UCC.

The following companies were selected for each advertised lot and have received subsidies as stipulated above for provision of various communication services:

MTN Publicom (Uganda) Ltd: was selected to install 69 public payphones in the selected underserved sub-counties. Work for the project was completed in July 2003.

Uganda Telecom Ltd: was selected to establish 20 Internet PoPs in the selected underserved districts and the project is ongoing and work is expected to be completed by the end of December 2003.

Uganda Home pages: was selected to develop IT content in the 26 selected districts. The project was completed and the [district portals](#) are online.

Telekom Equator: has established Internet cafés in Soroti and Mbale and an ICT training school in Soroti.

Conti-Comm Ltd: was selected to establish an Internet Café and ICT training in Kotido. This project has been delayed because of lack of an Internet POP. However, it is expected to commence in October 2003.

Andas Construction: was selected to establish an Internet Café in Bundibugyo and project work is yet to begin because of lack of an Internet POP. It is expected to start in October 2003

Rwenzori Research Consultancy: has established an Internet café in Kasese. The project is expected to be completed by the end of October 2003.

Extracts from: **Rural Communications Development Policy for Uganda**
Uganda Communications Commission, July 2001

3.4.2 Disbursement of the RCDF Funds.

Disbursement of the RCDF funds shall be for purposes of providing basic communications and Internet Services in rural areas. Disbursement of these funds will mainly take the form of non-commercial but competitive grants, along the following principles:

- a) The disbursement of the RCDF funds for public telephony projects shall be by open tender.
- b) The disbursement of the RCDF funds for Internet Points-of-Presence and training contracts shall be by open tender.
- c) The disbursement of the RCDF funds to applications in rural areas, which do not have services but are seeking amounts less than US\$15,000 shall be by **DIRECT DISBURSEMENT**. The main criterion for being considered will be the presentation of a business plan demonstrating financial viability and/or self-sustainability following the start-up contribution.
- d) The disbursement of the RCDF funds to applicants seeking support for 'rural packages' to enhance access to services for public telephony kiosks or telecentres and requiring grants equal to or less than US\$1,000 each shall be by **DIRECT DISBURSEMENT**. The main criterion for being considered will be the presentation of a business plan demonstrating financial profitability and/or self-sustainability following the start-up contribution.
- e) The disbursement of RCDF funds to support provisions of 'rural packages' to enhance access to services for a 'bulk' of public telephony kiosks or telecentres requiring grants less than US\$1,000 for each kiosk or telecentre *but in 'bulk' (exceeding more than 5 five access points)* shall be by open tendering.
- f) The disbursement of RCDF funds on a competitive basis, to support usage and ICT capacity in one school in each District.

3.4.3 Prioritisation

(i) The priority of the services to be offered shall determine the order in which funds are disbursed. The initial proposed prioritisation shall be:

- 1. Support for establishment of access to basic access services in sub-counties, which are un protected.
- 2. Support for introduction of Internet Points –of Presence (PoP) in every District H/q.
- 3. Promotion of ICT Capacity (training, management and maintenance of services established at vanguard institutions)
- 4. Promotion of ICT content creation.

5. Establishment of a domestic IXP.

(ii) Start-up Activities.

The following shall be the initial areas of concern.

- a) Provision of subsidies to independent area operators in the fully unprotected areas
- b) Support for pilot telecom – postal integration in small communications centres and kiosks/shops
- c) Support for the establishment of Internet PoPs in every district.
- d) Increase ICT use and capacity in Uganda by supporting ICT access by one ‘vanguard’ institution per district.
- e) Support the establishment of a national Internet exchange point (IXP).
- f) Support one school in each District, to start using ICT and also develop ICT capacity.

3.4.7. Fund Program

The Fund program shall be decided upon taking into account the size of the RCDF and the current priorities. The following methods have been identified, initially, but the Board shall be able to review and propose amendments if necessary:

(I). Alternative 1: General Disbursement Ratios of the RCDF.

Table A below shows the proposed General Disbursement Ratios, which shall only be used especially when the Board feels that there are enough funds to attend to all priorities at once. The ratios shall be subject to review every year at the time of preparation for the UCC annual budget.

Table A. General Disbursement Ratios

Item	RCDF Investment (%)
Public telephony infrastructure	40
User ‘rural packages’	3
Internet POPs and wireless access	12
IXP initiative	1
Vanguard institutions /organization ICT projects (one per district)	10
ICT start-ups and training(including support of ICT in one school per District)	20
Rural post franchise support costs	8
ICT training capacity investment	3
ICT Awareness and ICT Content creation projects	3
Total	100

(II). Alternative 2: Step-by-Step Method

Using this methodology, the RCDF shall be used to attend to the identified priorities starting with the first priority and using the balance, if any, to start on the second priority. This method is considered appropriate where there are limited funds. If this method is selected in the first year, then in the case of basic communication services, disbursement shall be in rounds, as follows:

(a) Round 1: Access to one (1) basic services point in all sub-counties with at least 5,000 inhabitants.

(b) Round 2: Access to a second basic service access point in all sub counties with at least 10, 000 inhabitants.

(c) Round 3: Internet Points of Presence, with at least one (1) public Internet café, in all districts of Uganda.

- (d) **Round 4:** Access to ICT by one “vanguard” institution /organization in every district in Uganda.
- (e) **Round 5:** Support of ICT capacity in Uganda.
- (f) **Round 6:** Establishment of Internet Exchange Point for Uganda (IXP).
- (g) **Round 7:** ICT Awareness and ICT content creation.

Annex I Discussion Note on Local Dialling for Internet within the Region

Introduction: The purpose of this note is to popularise use of Internet in rural areas of Nepal by allowing the user access Internet at local call charge within a development region. It is proposed that telecom network operators permit local rate access even if the ISPs are present at other locations where user is not allowed to have local call rate for telephone calls within the development region.

Call Charging Principles: Currently unit fee (local charging) is in use in the NT's network for telephone calls within a district. Indeed, the trend towards decrease in number of tiers for long distance calls is developing World over. At the same time, the rates for long distance are falling. In some countries local rate applies to the entire country. In several countries it is only two tiers; one applicable for local and the other for long distance. This trend is developing because the long distance transmission costs are decreasing.

Internet Market in the rural areas: The current market for Internet in a district centre is very limited. For example district centre of Palpa which is urban and also falls on the North-South Siddhartha highway as well as several districts are connected by road through Palpa. Yet Palpa has 30 Internet users and a private ISP is present there. It is obvious that other rural district centres are going to have even smaller number of users. However, it is important that we start stimulating demand for Internet by creating appropriate measures.

Dial-up at local rates: Currently it is possible for 52 districts to have dial- up facility at local rates for NT's ISP. NT has wide spread Telecom as well local admin infrastructure. Therefore, it is natural that most of the Internet users will subscribe to NT. However, to provide the choice to the users, it will be an excellent idea to give such access at local call rate to all the customers to whichever ISP they wish to use.

Rural Exchanges and trunks: NT's exchanges in the smaller districts are mainly remote line units which are parented to the main exchanges in the regional centres or Zonal centres. The local call setting up takes place at the parent exchanges. In some cases, depending on the Remote Line Unit, the local call uses two trunks for connecting subs where the RLU is located, whereas a call to region would need only one trunk to the parent exchange. Thus in some cases, remote party being called (district to regional call where the parent exchange is) is more economical from trunk occupation point of view. Apart from this the number of trunks required for carrying the Internet traffic is not going to be high due to very small number of Internet users in the district. This will not adversely impact the occupation of the trunks which connect RLU to the parent exchange. By the way as 2X30 trunks are dedicated to a 500 line RLU, and 4X30 trunks to a 1000 line RLU normally, there will be no additional trunks provided just for routing the Internet traffic. Thus additional costs for trunks for Internet also do not arise.

Internet Traffic in Rural Exchanges: The density of Internet in the Capital is estimated to be 40,000 accounts approximately 1 account per 10 lines of PSTN. This means, in a RLU of 1000 lines, there are currently 100 Internet users in average in Kathmandu. Therefore, Internet traffic of 100 Internet users through the RLUs has not congested the trunks of RLU. Therefore, 30 odd customers that may develop in the district will not affect the traffic congestion situation. These users will stimulate the trunk requirements of the ISP to interconnect their network from region to the centre which will be advantageous for NT once the National traffic increases.

Conclusion: The presence of several operators in rural areas gives choice to users. The possibility of several operators provides competitive service and quality of service for the users will be good. Though, the administrative advantage exists with NT, users still will have possibility of obtaining service from other operators if they so desired. Currently the national content is very low but as it develops further, the national transmission requirements will increase.

Annex J Proposal for establishment of Regional Nepal Internet Exchange

1. Situation analysis and background

The establishment of Nepal Internet Exchange, as an activity of ISP Association of Nepal with support from Computer Association of Nepal and other related bodies in 2002 has proved to be highly beneficial to the local Internet Community. In essence, the local exchange of traffic have grown from a nominal 200 Kbps in 2002 to more than 3 Mbps cumulative at the end of 2004. While this may not seem significant, it represents about 10 percent of the national Internet bandwidth capacity. The growth factor itself speaks for the benefits of the Internet Exchange.

To further extend the benefits of local traffic exchange, it is necessary that the successful model of operation be replicated in other major urban areas of Nepal. We foresee a need for local exchange facilities in the four cities of Biratnagar, Pokhara, Bhairhawa/Butwal and Nepalgunj. Birgunj and Dhangadi can also be considered if local situation demands.

The proposal is to enhance the capacities of the operators in those regions and also make the national Internet infrastructure more robust.

2. Project Methodology

The project will follow the standards set up in establishment of Internet Exchanges all over the world. It will mainly base its work from the experience in setting up the NPIX facilities in Kathmandu. The project will create the basis for establishment of Layer 2 switching facilities in the other cities. It will also enhance the capabilities of the Nepal Internet Exchange in Kathmandu, with addition of backup facilities.

The project will collect pre and post data from ISPs and peering partners to evaluate the significance of the IX. This data will be collected every three months. The research will also document the exchange facility and the growth in the data traffic. The project will research on the use of Internet patterns and the direction of data flow through data collected at the IX and in co-operation with the ISPs. Questionnaires, statistical analysis as well as interviews will be used to reach results.

A significant part of the project will be capacity building. Eight training workshops are planned in the two years period. The training workshops, which are planned every three months, will basically provide ISPs with the necessary skills to be able to peer at the exchange. This would mean trainings on BGP peering technology. This could also mean an exercise to evaluate the progress at the IXP. Foreign experts will conduct the training when possible. When there is no such possibility, by the NPIX co-ordinator. The project will undertake two levels of training for local ISPs and other possible partners- one at basic level and one at advanced level.

3. Partnerships Strategy

We aim to establish a healthy partnership with local industry bodies in each area where applicable. We'd work with local NGOs, chambers of commerce and other local institutions where possible.

We'd also partner with International and regional experts on Internet Exchange operations and training. Partnerships with APNIC is also required for enlisting the NPIX in its database, and for participation in its various activities.

4. Sustainability

The NPIX has been run on a sustainable basis through the fees collected from the ISPs. The same approach will be undertaken for maintenance and operation of the IXes in regional centers. The member would be charged on a cost recovery basis.

5. Duration /Timeline

The project duration would be for two years. The first year will concentrate on building capacities and preparing the ISPs for the network. The second year will create the local facilities and the IXes will come into operation.

6. Jargon

IX = Internet Exchange, IXP= Internet Exchange Point, APNIC= Asia Pacific Network Information Center, ISP = Internet Service Provider, IP = Internet Protocol , SANOG=South Asian Network Operators Group.

7. Project Budget in Nepalese Rupees

Item	Unit Budget	Total Budget
Infrastructure:		
L2 Switches (5)	75,000.00	372,000.00
UPS (5)	25,000.00	125,000.00
19" Racks and accessories (5)	12,000.00	60,000.00
Wiring and other	1,0000.00	5,000.00
Enhancement Rack for NPIX	35,000.00	35,000.00
Total		597,000.00
Trainings (8)		
Instructor Travel (8)	6,000.00	48,000.00
Local Training Expenses (8)	5,000.00	40,000.00
Training Fees (8)	10,000.00	80,000.00
Staff Times		
Time of NPIX CEO (6 manmonth)	10,000.00	60,000.00
Assistant / Co-ordinator (12 manmonth)	7,000.00	84,000.00
Research and Operational Costs (3)		
Research Workshop & tri-monthly publication	25,000.00	75,000.00
Evaluation		20,000.00
Total		860,000.00

Note on Infrastructure : The bulk of the infrastructure will be needed in the second year. But owing to the import times, it is advisable to do it earlier. It is also considered, if 5 sites are not feasible, the other equipment will be used as backup equipment for other sites, and be used when other locations are ready.

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(All comments to be sent through E-mail)
 Version 1.0 (20050110)

Annex K Sample infrastructure costings

1. NT's CDMA Access Incremental cost

CDMA: incremental cost when one base station is to be added with backhaul radio from the existing built up centre, with tower and power.

Cost of RF repeater radio	\$2000
Cost of pole installed on the hilltop	\$5000
Cost of micro base station with omni	\$12000
Cost of solar power	\$15000
Installation and transport @5%	\$2000

Total cost to provide telephony for up to 500 subscribers in the area \$ 40,000

Enhanced base station with Internet capability: as above plus \$16,000.

Per subscriber cost when filled - \$ 80.

Subscriber equipment for remote fixed terminal - say \$ 150 for external antenna feeder and fixed equipment. (Mobile terminal less, say \$60, works close to base station).

2. WIFI Access from District Headquarters to VDCs for telephony and Internet

In order to calculate per line cost of access network using WiFi technology in a district, a sample calculation was done. District HQ is provided with wifi connectivity as well as providing links to three Access Points (AP) of WiFi wireless. These three APs located on the hilltops provide access to 20 settlements through client wireless equipment. These client wireless equipments connect a number of subscribers in each location. The network can also provide Ethernet access to Internet in all 20 APs. We assume 8 subscribers per client site, thus altogether 160 subscribers are served by the system. The cost per subscriber works out at US\$480, and if a contingency of 20% is added it will be US\$600. The per subscriber cost very much depends on the number of subscribers we can get in each AP. Subscribers can be located up to about 300 feet away from it. Except DHQ, in all the places solar power is provided and this is a very significant element of the cost.

The cost of telephones is insignificant (say \$10 each), but for internet access some form of computer will be needed which will add to the per internet subscriber cost.

3. VSAT installations

A VSAT hub designed to serve 500 remote terminals costs around \$2.8m, with an annual running cost of over \$0.5m (largely bandwidth costs). Each remote terminal dish costs around \$5,000 and will support two direct lines. Terminal costs can be shared among up to (say) 40 lines nearby by additional investment in a small local switch and distribution cable.

4. Cost of establishing a new POP in a DHQ

The DHQs where POPs are not present have very small number of users. Therefore, establishing a POP there is uneconomic. However, as an academic exercise such a cost has been calculated which is as below:

Cost of Equipment – Rs. **284,400 or US\$ 3,950**

Annual running Cost - Rs. **583,200 or US\$ 8,330**

Cost of a POP in DHQ of licensee operating in the regional centre

Sr. No.	Items	Qty	Price US\$	annual costs
1	Cisco 2509 terminal server (16 Async port for 16 dial-in modems 2 serial ports for WAN connection 1 ethernet)	1	600	
2	External modems for dial-in	5	250	
3	DSL modems for regional ISP connectivity	2	1200	
4	NTC lease-line cost (per year) *			700
5	Web/mail/authentication server	1	600	
6	Workstation computer	1	400	
7	Power Equipment (UPS+batteries)	1	900	
	Total cost of equipment in Rs.		3950 284400	
	Staff salaries			
1	System administrator	1		3000
2	Technical support	1		2400
	Accommodation +electricity and water			2000
	Recurring cost annual in USD in Rs			8100 583200

Annex L Rural Water Supply and Sanitation Fund Development Board

Organisational Profile²⁸

Background

The Rural Water Supply and Sanitation Fund Development Board (the Board) was created on 14th March 1996 through His Majesty's Government's approval of a Formation Order under the Development Board Act, 1956. The Ministry of Housing and Physical Planning is the line ministry for the Board. The Board's main objective is to promote sustainable and cost effective demand-led rural water supply and sanitation services with full emphasis on community ownership in conformity with the Government's Eighth Plan (1992-97) sector policies, which aimed at fundamental changes in rural water supply and sanitation service delivery mechanism in the country.

The Board is currently supported by an [International Development Association \(IDA\)](#) credit to implement the Rural Water Supply and Sanitation Project (the Project), including the initial operating costs of the Board. The Board allocates resources, on a grant basis, to selected partnership between support organizations (SOs), which include national/ international non-governmental organizations and private sector firms, and communities.

The Board is designed based on the experience of a field testing pilot project, acronymed 'JAKPAS' (the Nepali acronym of Janata Ko Khanepni Ra Sarsafai Karyakram - meaning People's Water Supply and Sanitation Program). Preparation studies for the pilot were carried out with funding by the [United Nations Development Program \(UNDP\)](#) and a grant from [Japanese Grant Facility \(JGF\)](#). The World Banks executed the pilot for a period of three years, during 1993-96, financed by two additional JGF grants.

Organisation and management

The Formation Order has provided the Board full operational autonomy. The Board is supervised and managed by seven Board members comprising of four Government's Joint-secretaries, one each from National Planning Commission, Ministry of Housing and Physical Planning, Ministry of Finance, and Ministry of Local Development, and two professionals representing non-government sector and one representing private sector, nominated by the Government for a three-year term. According to the provisions of the Formation Order, the nominated professional members that includes one woman member, have more than ten years' experience, one each in the field of rural water supply and sanitation engineering, participatory rural development and health and sanitation. The Board members have elected one of the members as chairperson of the Board for a three-year term. The first chairperson was the Secretary of the Ministry of Housing and Physical Planning for the initial two-year period.

Board policies are implemented by its head office, located at Kathmandu, consisting of thirty-eight staff. They include seven managers - an Executive Director, a Deputy Executive Director, and five division chiefs (operation, monitoring and evaluation; technical; human resource/program development; administration; and Management Information System Divisions);

three officers, twelve portfolio managers and sixteen support staff. All staff, including the Executive Director, are recruited on a competitive basis for a fixed term, with possibility of extension based on satisfactory performance. At least two of the six managers, if available, should be women to ensure addressing of gender issue in the Board's programs. The Board members frame Board rules and operating procedures. The operating procedures are detailed and presented in the implementation manuals. A Technical Advisor, appointed for two years under a UNDP grant assistance, advises the Executive Director on the management issues of the Board.

Programme implementation

The Board provides technical, institutional and financial support to SOs and communities to implement rural water supply and sanitation schemes and other related activities. For the initial

²⁸ Material from www.rwss.org

two years, the Board operated only in two development regions - Central and Western. Eastern region will be added in the third year and the remaining two regions - Mid-western and Far-western - in the fourth year. To increase ownership and sustainability, beneficiary communities, represented by water users' committees (WUCs), implement schemes with the assistance of SOs. The community-based demand-driven approach to scheme identification, design, construction, operation, and maintenance moves the emphasis from the traditional physical infrastructure development to community development approach in order to increase beneficiaries' participation in decision-making, in implementing their decisions, and in sharing the benefits of the schemes.

Programme components

The Board provides grant assistance to communities and SOs for the implementation of rural water supply and sanitation programs, which also integrates the following components: (i) community mobilization; (ii) non-formal education (NFE); (iii) health, hygiene and sanitation education (HSE); (iv) capacity building of SOs and communities; (v) water source protection; (vi) construction of family and institutional latrines; (vii) skill-based training; (viii) women's participation and capacity building; and (ix) other programs to support sustainable and cost-effective water supply and sanitation development.

To popularize and promote the Board financed programs in the rural communities, the program is short-named as 'KHASKOSH PROGRAMS', which literally means 'Special Fund Programs'. This is also a Nepali acronym of 'Khanepani Tatha Sarsafai Kosh Karyakram' - meaning 'Water Supply and Sanitation Fund Program'.

Scheme cycle

The Board follows a scheme cycle of about 36 calendar months required from the selection of SOs and schemes to the completion of schemes. (At present, the same scheme cycle is followed for both the Hill and Terai schemes. The cycle was tested and recommended by JAKPAS mainly for Hill schemes. Because of different needs of Terai due to different socio-economic and geographic conditions, the Board has initiated a study to test and determine an appropriate scheme cycle for the Terai). The scheme cycle takes into account the seasons, harvests and holidays, and their influence on site accessibility, water source yield measurement, availability of labor, and conditions and timing for construction, as well as time needed to process the selection of SOs and schemes, the development and implementation phase proposals and the contracts. Each financial year a new batch of schemes with a new scheme cycle is introduced. Each scheme-cycle consists of three main phases as briefly described below:

The Pre-development Phase of a scheme lasts about 13 months and begins in October of any given year. Its main objective is to identify and select SOs and schemes that meet Board's eligibility criteria to enter into partnership between the Board, SOs and communities. Support organizations selected for any one batch are retained in the following batch subject to their satisfactory performance. Additional SOs are selected in each new batch depending on the availability of schemes. The selection is made transparently through public announcement in the month of October each year, adopting comprehensive screening procedures, including site verifications, laid down in the manuals. The selected SOs submit pre-feasibility studies of schemes in collaboration with needy and willing communities, and in consultation with concerned village and district development committees, for Board appraisal. The schemes are reviewed against Board's eligibility criteria, which includes on-site appraisals, before they are approved for Board financing. Upon approval of the schemes, the SOs submit proposals for community development activities. The proposals form the basis for the preparation and finalization of development phase contracts between the Board and the SOs. The SOs are required to inform and consult with the concerned village and district development committees on all future activities in the communities.

The Development Phase lasts about ten months and begins in November of the second year with development phase contracts concluded between the Board and the SOs. Under the contracts the Board provides financing for staff, overheads, two lump sums: one for the sanitation revolving loan fund (SRLF), the other to reimburse the SOs for their costs incurred for pre-feasibility studies of the approved schemes, and costs for other miscellaneous activities. The contract includes a comprehensive terms of reference for the SOs for activities to be undertaken

under the development phase. Payments to the SOs are made in three parts, linked to the completion of specific tasks under the contracts.

The development phase activities include: orientation and training to SOs' staff; community preparation; and finalization of tri-partite contracts between the Board, SOs and communities. The SOs implement community development activities, which include HSE, NFE (optional), preparation of community action planning (CAP) for the implementation and management of the schemes, legal registration of water users' groups (WUGs) and formation of water users' committees (WUCs), discussions and community decisions on technical and service level options, detailed design of the schemes and preparation of the implementation phase proposals. During this phase, the communities open bank accounts, collect cash contributions to meet part of the construction cost, and also the first year's operation and maintenance cost in advance. Promotion and construction of household latrines are also started.

The implementation phase proposals form the basis for the preparation and finalization of implementation phase contracts. Only those communities who successfully complete the development phase activities, and are willing to participate in the implementation phase, submit implementation phase proposals.

The Implementation Phase lasts about 13 months and begins in August of the second year. Tripartite implementation phase contracts are concluded between the Board, SOs and the communities, represented by WUCs.

Under the contracts, the Board provides two types of financing - one for the construction of water supply schemes (non-local materials, skilled labor, and transport) and for other complementary activities, and the other for SO staff and overheads. The implementation phase activities include: training to SOs' staff and community members; procurement of non-local materials and transportation; collection of local materials; construction of water supply schemes; advance the promotion and construction of household and school latrines; establishment of women's technical support services for income generating activities; and source protection.

Payments are made to two separate accounts: construction cost to SO-community joint accounts, and community development cost to SO accounts. Both payments are made in two parts for construction, and three parts for community development, linked to the completion of specific tasks under the contracts. The contract also includes a comprehensive terms of reference for the communities and SOs for the activities to be undertaken under the implementation phase.

The outcome of the implementation phase is the consolidation of all development and implementation phase activities, a completed and functioning water supply and sanitation scheme, and trained WUC and community members to operate and maintain the scheme.

Support organisation eligibility criteria

To ensure that only competent and qualified SOs are selected to work in partnership with the Board and communities, the Board transparently applies the following eligibility criteria for the SO selection:

- Evidence of legal registration of the SO;
- Constitutional provision of the SO to engage in rural water supply and sanitation or rural development activities;
- Updated, audited, and certified accounts;
- Proven track record of at least two years in participatory rural water supply and sanitation, and/or related community development activities; and

Each new SO is evaluated by the Technical Appraisal Committee (TAC) of the Board and assessed at the field, particularly concerning its track record and staffing capacity before selection, using a ranking system provided in the implementation manuals. TAC recommends top-ranking SOs in required number to the Board members for approval.

Scheme eligibility criteria

Each scheme accepted for financing has to meet the following eligibility criteria as presented in the Rules:

- A scheme must meet one or more of the following need and economic viability criteria:
 - The benefit/cost ratio of the scheme is at least 1.5, with per capita cost below the thresholds given for different water systems. The benefit/cost ratio is estimated in the pre-development phase. Benefit, at present, is estimated on the basis of the value of the average time saved each day by the community.
 - The average existing water availability is less than 15 liters per capita per day, and per capita scheme cost is below the thresholds given for different water systems.
 - A majority of households are dependent upon heavily polluted water sources and per capita scheme cost is below the thresholds given for different water systems.
- A scheme must meet the following technical criteria:
 - The proposed water source is unpolluted, undisputed, and yields at least 45 liters per capita per day (if there is no other solution, and existing sources are heavily polluted or provide under 15 lpcd, a minimum of 25 lpcd is also acceptable). The scheme must meet the engineering standards and service levels prescribed in the Board's technical manual, and the scheme proposal must include measures to mitigate adverse environmental consequences.
- A scheme must meet the following criteria on sustainability and willing-ness to pay:
 - The community contributes to the capital cost covering all unskilled labor, locally available materials, porter fees, and the cash contribution is at least 2.5% of the construction cost in the Hills, and 20% in the Terai (Both cash and kind contributions combined adds, on an average, up to 30% of the scheme construction cost.). Community also contributes all additional costs for service levels higher than those provided under Fund's technical manual;
 - The community makes satisfactory operation and maintenance arrangements, including engaging a village maintenance worker, establishing a system for collecting maintenance funds on a regular basis, and paying the first year's operation and maintenance cost in advance. The operation and maintenance cost is estimated at 3% of the total scheme construction cost in the Hills, and 4% in the Terai);

A WUG is formed and registered under the Water Resources Act comprising all beneficiary families, and a WUC with representatives from each cluster, including at least two women members, is constituted to manage the implementation, operation and maintenance of the scheme; and

 - All households in the community are covered.

The above eligibility criteria are applied to schemes to qualify for both the development and implementation phases of the scheme cycle.

To ensure economy of scale, SOs are contracted for at least 3-4 geographically clustered schemes. Each scheme is site appraised by the Board during the pre-development and development phases to ensure sustainability aspects of the scheme implementation. TAC recommends to the Board members for approval only those schemes that meet the eligibility criteria.

Monitoring, evaluation and supervision

The Board, set up as a facilitating agency, maintains that the primary managers of specific schemes are the WUCs and SOs. However, the Board adopts a comprehensive monitoring, evaluation and supervision system for both the development and implementation phases to ensure technical quality and effective beneficiary participation. The Board also monitors implementation progress, impact of the investments made, and the quality of performance of the contracted SOs. Such monitoring puts emphasis on the responsibilities and interests of communities and SOs in terms of field implementation and quality control.

Each SO and community is required to maintain accounts of income and expenditure in the formats provided by the Board, and regularly provide the Board with updated actual scheme accounts on expenditure of any payment before a next payment is made. Independent auditors recruited by the Board finally audit their accounts. The schemes are also technically audited after completion.

Role of women in scheme implementation

The Board upholds the importance of women involvement in all stages of a scheme cycle, because they are the main collectors, users and managers of household water. At the same time, they are the ones who influence family sanitary habits through their central role in family hygiene, child care and food preparation. For this reason, the Board promotes the role of women in five key areas: (i) Women are guaranteed representation in WUCs, which must have at least two women members selected by women, and preferably one to undertake the responsibility of treasurership; (ii) HSE and NFE activities focus on women; (iii) Women are encouraged to take advantage of women's technical support services program, providing specific skill and management training to increase the scope of income generating activities, and help women gain access to formal credit systems; (iv) Women are encouraged to form women tapstand groups to collect monthly operation and maintenance fees, and to maintain tapstands; and (v) the selection and training of women maintenance workers.

Promotion of the private sector

The main objective of the Government to establish and operationalize the Board is to gradually transfer the water supply and sanitation service delivery responsibility to the private sector. With this objective, the Board is designed to operate in partnership with SOs and communities, and obtain the services of national SAs to provide it technical, institutional, and operational assistances in various stages of scheme implementation.

Implementation experience

During its initial operation of two years, the Board has gained a variety of experience. Some of the important ones are summarized below:

- Strong demand for water supply and sanitation services exists, and communities are willing to contribute to the capital cost in part (on average 30% of the scheme construction cost) and operation and maintenance cost in full. The Board receives requests for schemes in much greater numbers from SOs and communities than it can support.
- There are enough SOs available to assist communities to implement rural water supply and sanitation schemes. This has been apparent from the very competitive selection of SOs by the Board. However, the technical capability and level of awareness on participatory process among them varies. Additionally, geographical distribution of SOs, particularly in respect of quality, is not uniform. For these reasons, the need to enhance their capabilities must be continued for sometime in the future.
- The applied duration of the scheme cycle of 36 months, which was initially considered long by some, has proven to be adequate. More time is needed for the community development work required using a participatory approach, implementing the technical activities, processing proposals and contracts, and providing allowance for the effects of seasonal patterns, harvests, and holidays on program implementation.
- The SO and scheme eligibility criteria are found to be generally appropriate, although improvements are possible. The eligibility criteria have been of great help to the Board in applying a fair process of selecting the more competent SOs from an overwhelming number of aspiring SOs, and in approving schemes of a great number of needy and willing communities.
- The Board is able to manage a large number of small contractual agreements with communities and SOs through a small number of qualified and motivated staff with the support of private sector consulting firms. Clear criteria for schemes and SO selection, transparency in resource allocation to both the SOs and communities, sufficient autonomy from outside interference, and efficient logistical support have contributed largely to better management of contracts.

- The SOs' social service motivation is a major factor in achieving effective community participation and results. It has been observed that once an SO's political orientation and commercial motivation is reflected in their work, difficulties arise in obtaining satisfactory results.