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For the

Ministry of Information & Communications (MOIC)

Volume I: Final Report

For

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

January 19, 2006

TABLE OF CONTENTS

VOLUME I - FINAL REPORT

LIST OF ANNEXES

VOLUME II – 1st LOT OF STUDY REPORTS ANNEXED TO FINAL REPORT

1. Review of International Experience – *December 12, 2004*
2. Sector Overview Report – *December 23, 2004*
3. Strategy Report – *March 16, 2005*

VOLUME III – 2nd LOT OF STUDY REPORTS ANNEXED TO FINAL REPORT

4. Report on Design of Pilot Project – *June 7, 2005*
5. Design of Bidding Process – *November 7, 2005*
6. Demand Study Report Volume I: Field Survey – *November 10, 2005*
7. Demand Study Report Volume II: Demand Modelling – *November 10, 2005*

LIST OF OTHER AVAILABLE PROJECT REPORTS

8. Proceedings on Workshop on Strategies for Increasing ICT Access in Rural and Peri-Urban Areas of Nepal – *December 31, 2004*
9. Proceedings on Final Workshop on Strategies for Increasing ICT Access in Rural and Peri-Urban Areas of Nepal – *Jan 5, 2006*

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

ADDCN	Association of District Development Committees of Nepal
AEPC	Alternative Energy Promotion Centre
APT	Asia-Pacific Telecommunity
CARD	Computer aided Administration of Registration Department
CATV	Cable Television
CBO	Community Based Organisation
CBS	Central Bureau of Statistics
CDMA	Code Division Multiple Access
CR	Community Radio
CRM	Community Radio Madan Pokhara
DANIDA	Danish International Development Agency
DDC	District Development Committee
DHQ	District Headquarters
DLGSP	Decentralised Local Governance Support Programme
DOE	Department of Education
EDR	Eastern Development Region
FITEL	Fund for Investment in Telecommunications
FM	Frequency Modulation
FMD	Frequency Management Division
HLCIT	High Level Commission for Information Technology
HMG	His Majesty's Government
ICT	Information and Communication Technology
IDA	International Development Association
IFDF	ICT Facilities Development Fund
ISP	Internet Service Provider
ISPAN	Internet Service Provider Association of Nepal
IT	Information Technology
ITPF	IT Professional Forum
KW	Kilo Watt
MARTS	Multi-Access Radio Telephone System
MCT	Multipurpose Community Telecentre
MHz	Mega Hertz
MLD	Ministry of Local Development
MOES	Ministry of Education and Sports
MOEST	Ministry of Environment, Science and Technology
MOIC	Ministry of Information and Communications
MOST	Ministry of Science and Technology
MoU	Memorandum of Understanding
MSI	Media Services International
NEA	Nepal Electricity Authority
NFEJ	National Federation of Environmental Journalists
NGO	Non-governmental Organisation

NITC	National Information Technology Centre
NLSS	National Living Standard Survey
NPIX	Nepal Internet Exchange
NR	Nepalese Rupee
NT	Nepal Telecom
NTA	Nepal Telecommunications Authority
ODC	Organisation Development Centre
OPGW	Over Power Ground Wire
PAF	Poverty Alleviation Fund
PCS	Professional Computer System Ltd
PCO	Public Call Office
POP	Point of Presence
PPME	Policy, Planning, Monitoring & Evaluation Section
PSTN	Public Switched Telephone Network
RFPD	Request for Proposal Development
RMC	Rural Market Centre
RTS	Rural Telecommunication Service
RTDF	Rural Telecom Development Fund
RTDFMC	Rural Telecom Development Fund Management Committee
RUPP	Rural–Urban Partnership Programme
RWSSFDB	Rural Water Supply and Sanitation Fund Development Board
SDH	Synchronous Digital Hierarchy
SECEN	Society of Electronics and Communication Engineers
STM	STM Communications LTD
TLO	Tole/Lane Organisation
TOR	Terms of Reference
TSRP	Telecommunication Sector Reform Project
TV	Television
UNDP	United Nations Development Programme
UTL	United Telecom Ltd
VAT	Value Added Tax
VDC	Village Development Committee
VHF	Very High Frequency
VSAT	Very Small Aperture Terminal
WLL	Wireless Local Loop
WiFi	Wireless Fidelity

Executive Summary

This is the final report of a 16-month project which has already produced several deliverables. This report aims to provide an overview of the entire project; readers are referred to the earlier deliverables for details of particular components.

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, 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 the Tenth Development Plan (Poverty Reduction Strategy) of His Majesty's Government of Nepal and the Millennium Development Goals.

Most of the work has fallen into two major phases:

- Formulation of a strategy for improving access to ICTs in rural Nepal, including institutional arrangements.
- Elaboration of a pilot project together with procedures for setting it up, awarding funding and carrying out a demand study.

The strategy is based on the following cornerstones, which were established through widespread discussion:

- 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 is illustrated, in the hope of fitting the variety of different conditions in rural Nepal.
- The focus for action is 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 the Internet (along with achieving other useful purposes), and we propose a realistic, if stretching, programme to do this.
- A range of central actions is vital to support community-based efforts and to implement the fully liberalised environment needed for enterprise to flourish. Some of these pertain to the Ministry of Information and Communications/Nepal Telecommunications Authority (MOIC/NTA), but all government departments will need to play their part, including supporting applications and content.

The proposed approach to extending network infrastructure takes account of current conditions in Nepal as follows:

- 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 (PCO) 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 the 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 coordinated with the provision of electricity supply, and we recommend that this be done wherever possible.

We believe that most demand is capable of being met on a commercial basis, given full implementation of the previously agreed liberalisation policy. However, subsidies will be needed to reach very poor and remote communities, and will be valuable in kick-starting ICT developments.

Our costing points to a subsidy programme of some $14m over 5 years, of which up to $10m could be spent on extending telephone infrastructure to remote settlements and providing public call offices where these do not arise within a year of coverage. Around $1m would be spent on public Internet access points in rural market centres, and around $3m on a variety of community-based access projects and content and applications development. The most ambitious community-based project is providing computers to secondary schools.

Current legislation gives NTA the responsibility of managing the Rural Telecom Development Fund (RTDF). Successful implementation of community-based ICT projects requires a new approach. We therefore propose institutional arrangements for parallel, accountable and coordinated management of two separate funds, RTDF and a new ICT Facilities Development Fund (IFDF). We envisage that as these bodies demonstrate their competence, they will be well placed to attract additional external funding. We have drafted manuals for the operation of both funds, including guidance on tendering procedures for different types and sizes of project.

There is potential for rural ICT access to contribute significantly to almost all areas of development. Three areas where ICT access can be particularly valuable are education, health and agricultural information. Programmes in all three areas will need to be set up over the next few years, with participation from both IFDF 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 networks built beyond NT's roll-out plans.

Our demand studies included new fieldwork in several locations and analysis of existing household survey information. Both point consistently to immediate demand for telephony far above current levels of supply – at least 30% of households and close to 100% of businesses. Demand for the Internet, however, remains very low outside towns. This finding supports our strategy of aiming to build demand for the Internet in step with providing facilities to meet the demand.

Our preferred approach for pilot projects would have been to cluster them within a few districts, for mutual support and to start to build centres of expertise. Practical constraints prevented this approach being adopted, and instead we have planned the following pilot activities:

- Cybercafés in the district headquarter towns in three identified districts
- Telecentres in smaller rural market centres in these three districts plus a further five identified districts, making eight in all
- Provision of computers in 40 secondary schools in each of these eight districts, to be followed by connecting them to the Internet
- Support for regional Internet switches, initially in four selected major towns outside the Kathmandu Valley.

It is planned to undertake all these pilot activities in close collaboration with existing organisations that have appropriate involvement and expertise. Draft Memoranda of Understanding (MoU) between NTA and such organisations have been drawn up to clarify roles.

A further highly recommended activity, which cannot be pursued in current circumstances, is supporting new community radio stations.

1 Introduction

This report is the final report, a deliverable for the study entitled "**Increasing ICT Access in Rural and Peri-Urban Areas of Nepal".** The study is part of the Telecommunication Sector Reform Project (TSRP) being implemented, with the International Development Association (IDA) credit, by the Ministry of Information and Communications (MOIC). This report is structured in three volumes:

- Volume I - Final Report
- Volume II- First lot reports annexed to the final report
- Volume III- Remaining lot of study reports annexed.

The main counterpart of the project has been Mr. Ramesh Kumar Adhikari, Under Secretary, Project Co-ordinator, MOIC. ICT Working Group consisting of high officials of MOIC and NTA was created to facilitate the study (Annex-2).The Terms of Reference are included in the Annex -1.

The Consultants wish to express their sincere thanks for the strong support that they have received from the counter parts. The Consultants express their sincere appreciation to the Chair and members of the ICT Working group for their valuable suggestions and guidance in the progress and finalisation of the entire study. The level of co-operation, understanding and support has been exceptionally strong, making it possible to advance quickly, and discuss practical proposals at an early stage.

The Consultants also wish to express their appreciation of the support and co-operation that they have received from World Bank staff, working on the project in close co-operation with MOIC and NTA officials.

2 Objectives of the Study and Structure of the Assignment

The Terms of Reference (ToR) contain a number of objectives and phased structured tasks, with a detailed list of activities to be carried out within each task. After the end of each task or part thereof, one deliverable in the form of a report was produced. The details of deliverables are given in Section 3. To satisfy each particular objective, tasks performed in one or several deliverables come into play. Therefore, one or more deliverables need to be examined to determine how each objective has been met by the study. The detailed ToR for the study is included as Annex-1 in this report.

2.1 Objectives

This study had the following objectives:

- To develop an understanding of the characteristics of the rural/peri-urban and low income ICT market to enable determination of appropriate methods of meeting this demand, including the appropriate institutional arrangements.
- To determine the cost of providing ICT access to rural/peri-urban and low income users (groups) and the proportion of the cost that should be borne by these users compared with the proportion that should be subsidised by the Rural Telecom Development Fund (RTDF).
- To determine the cost of expanding Internet points of presence in all districts in Nepal, and also to encourage the private ISPs to expand their services in the rural areas.
- To recommend the institutional and regulatory requirements for operation of the RTDF.
- To set out the mechanisms for the private sector to participate in the delivery of ICT services for rural and low income users and the regulatory requirements to monitor such service providers, and to recommend a detailed strategy to improve access to ICT in rural/peri-urban and other under-served areas.
- To develop appropriate business models for the sustainable delivery of ICT access to rural/ peri-urban and low income users through public–private partnerships.
- To design and support His Majesty's Government (HMG) in conducting a pilot project for public access to ICT.

2.2 Achievement of objectives

The study was based on a more detailed ToR (Annex-1), designed to meet the above objectives. Let us examine in summary how these objectives have been met in the study:

- **Characteristics of the low income ICT market and methods of meeting demand**: *The Sector Overview* has created the background to understanding the characteristics of the market, which are as follows:
  - Very low penetration of telephones in rural areas, but demand exists throughout the country.

  - Internet has just started appearing in District Headquarters (DHQ) but the demand is very low, even in these comparatively developed centres. Illiteracy, poverty and lack of perceived useful applications apart from the lack of access facilities are the main causes of low demand.
  - Demand for broadcasting – radio, TV and FM radio in particular – is high but again these have coverage problems.

- **Cost and manner of providing ICT access to rural and low income users**: This has been primarily developed in the *Pilot Project Design*.
  - Telephone service can be largely taken care of by commercial means except for a small percentage of population. The requirements for subsidies to extend coverage of telephones up to 98% of the population have been worked out.
  - Rural areas need promotional interventions to establish telecentres for Internet access, and FM radios and almost full assistance for school computers and Internet. The coverage objectives for each of these ICTs have been worked out and the subsidies required have been presented.

- **Cost of encouraging the private ISPs to expand their points of presence in all districts in Nepal**: *The Sector Overview* sheds light on this.
  - Apart from the main regional centres, where private ISPs already exist, the demand for Internet services is low. Private ISPs are not required to be physically present in the district centres as long as they can be accessed at local call rate from the districts within a region.
  - Therefore, NTA was strongly advised to take regulatory steps to oblige incumbent ISPs to provide local call rate access for any ISP in the same manner they do for their own Internet customers
  - The cost of providing Internet switching facilities in the bigger regional centres has been worked out as assistance to ISPs.

- **Recommend the institutional and regulatory requirements for the operation of the RTDF**: This has been worked out in detail in the *Bidding Process Design*.
  - The need for a proper autonomous institution for implementing ICT projects was very strongly felt in order to manage ICT activities other than telecom infrastructures. The draft manual for regulatory structure (organisation and functions) has been developed. The institution is called ICT Facility Development Fund (IFDF).
  - An RTDF management committee under NTA was recommended for managing telecommunications infrastructure with RTDF. Its organisation and functions have been worked out and an RTDF manual has been developed.

- **Set out the mechanism to enable the private sector to participate in the delivery of ICT services for rural and low income users and develop appropriate business models for the sustainable delivery of ICT access to rural/peri-urban and low income users through public–private partnerships:** These related objectives have been dealt with in *Strategy Report*, *Pilot Project Design* and in *RTDF* and *draft IFDF manuals*.
  - Telecom infrastructure requiring application of RTDF will mainly be utilised by competitive bidding for support (subsidy) or maximum coverage for fixed support. Some smaller initiatives may also be dealt with by criteria not requiring competitive bidding.

- Telecentres are to be installed for promotional purposes and should be established with initial one time support under community ownership. The sustainability of these will then be the responsibility of communities, with some supervision from the government agencies.
- These projects will be again on a demand-driven basis.
- Computers and Internet for Schools Project will also be one time support to the schools.
- FM radio is another item identified as a very useful investment for rural development and empowerment also requiring one time support for equipment under community ownership.

- **Design and support HMG in conducting a pilot project for public access to ICTs**: This design part has been dealt with in *Design of Pilot Project* and *Designing Bidding Process* and the implementation support has been carried out during pilot project implementation.
  - Telecom infrastructure and PCO implementation has been deferred for a year or two while NT is implementing its large scale rural coverage through CDMA and district satellite projects. This is the time when NTA is advised to engage itself in determining the gap between what NT is going to implement and the national objective recommended in the strategy document.
  - For all ICT project components, project partners have been identified for pilot project implementation, which requires special skills in implementation of community owned demand driven projects. Suggested are experienced partners like Rural–Urban Partnership Programme (RUPP) for telecentres in rural market centres and cybercafés in the DHQs, an experienced national NGO for the Computers and Internet for Schools Project, and Internet Service Provider Association of Nepal (ISPAN), the owner of Nepal Internet Exchange (NPIX), with experience in establishing and running peering arrangements, for the regional Internet switching project.
  - The MoUs with partners and required bidding documents for equipment and services have been designed.

2.3 Overall structure of the assignment

In brief, to meet the above objectives, the overall assignment was divided into three (3) phases, each of which contained a number of activities to be performed. The details of tasks to be performed are given in Annex-1.

2.3.1 Phase I

This phase consisted of the following activities:

- To analyse the existing level of provision of these services and determine existing potential demand for them and constraints to their development (technical, economic and regulatory).
- To propose viable alternatives to meet this demand, with a detailed analysis of the costs involved as well as the regulatory implications, and also suggest the role of the RTDF.
- Based on the above analysis, to develop practical strategic options and operational schemes for the provision of necessary infrastructure and services, such as Internet Points of Presence, telecentres, and Internet access for schools.

2.3.2 Phase II

This phase consisted of the following activities:

- To conduct a demand study.
- To develop a detailed pilot project to be funded by the RTDF (managed by NTA) to demonstrate the viability of the proposed strategy.
- To prepare the bidding documents for the pilot project (for Internet POPs and telecentres), which can be considered as an experimental bidding round from the RTDF.

2.3.3 Training (Consensus building and transfer of skills)

This task consisted of the following:

- To conduct an in-country workshop to present the findings and outputs of the assignment, as an essential step in securing the necessary consensus to ease approval of the policies developed with all stakeholders in the sector.
- To provide, throughout the assignment, hands-on training to MOIC staff in ICT in an effort to transfer skills to their counterparts.

2.3.4 Phase III

This phase consisted of the following activities:

- To support HMG in conducting the competitive bidding process under the pilot project designed in phase II.
- To support HMG in negotiations with the winning bidders.

3 Phase I – Background Work for Developing Strategy

In this phase, two background reports on "*Sector Overview*" and "*Review of International Experience*" were produced for developing strategies for increasing ICT access in the rural and peri-urban areas. Two workshops were conducted: the first one consisted of a small group of experts to discuss various options for strategies; the second was organised to discuss and develop consensus for final strategies with stakeholders, and had a larger number of participants.

3.1 Summary of findings from Sector Overview

- Ruggedness of the major part of the country; size of rural population (85%); huge diversity in distribution and densities of population, ethnicity and language.
- Rural infrastructure – 15 of the 75 DHQ were yet to be accessed by road; electricity has reached only 40% of households on average.
- Rural economy – 80% of the people are dependent on agriculture; much skewed income distribution (the total consumption of the highest decile is six times as much as that of the lowest decile, and eleven times as much for non-food items); about 32% of the population live below the poverty line.
- Low literacy rate – 53% of the adult population; the rural average being still lower.
- Use of information systems and email/Internet by the government is at a fairly low level. Use of websites for some public services is developing slowly; delivery of some public services through the web is being promoted by HLCIT/NITC/MOEST. Government does not yet use email in its transactions.
- The broadcasting sector is reasonably liberalised and a number of FM broadcasting licenses, both commercial and community owned, are in operation.
- Community FM is the proven media for rural development.
- Nepal has substantial experience in establishing telecentres which provide communication and Internet services in the community. Sustainability aspects such as lower operational expenses, opportunities to earn from other than communication and information services, and sustained central guidance for some time are essential needs to be considered right from the beginning of the project. Telecentres in the past were lacking in these to some extent.
- There are a number of private or NGO initiatives in Nepal for providing ICTs.
- Autonomous institutions like Alternate Energy Promotion Centre, Water and Sanitation Board and Poverty Alleviation Fund were found to be suitable examples for implementing community owned and demand driven projects like ICTs under full or part subsidy.
- The telecom sector has been slow to liberalise and telecommunication services are mainly limited to the capital city and the municipalities. Rural coverage is very low and that too has further suffered quite extensively in the conflict and due to security reasons.

- Table 1 shows the telecom status in the subdivisions of the country, highlighting its inadequacy. Similar opinions expressed by the people in the Table 2 are also worth noting.

TABLE 1: TELECOM STATUS AND DEMOGRAPHIC FEATURES OF 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

TABLE 2: OPINION OF ADEQUACY OF GOVERNMENT TELEPHONE FACILITIES[1]

	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
Mid Western	8.1	43.5	48.4
Far Western	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	33.5	61.9	4.7
Kathmandu Valley	42.6	56.0	1.4
Other	28.7	64.9	6.4
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**

- Most of the district headquarters did not have Internet services until mid-2004 when local rate dial-up Internet was made possible in some districts. Now altogether 55 districts in the country have such facility. The other 20 districts will join only by the end of 2006 if NT's CDMA and district satellite services expand as planned.
- NT's recently launched CDMA wireless telephone project for extensive rural coverage is waiting for Supreme Court clearance to proceed further. 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 98% of the rural population by 2010. Nepal Telecom is deploying the first phase of 1m lines (fixed and mobile, in proportions not yet firmly decided) by July 2007 (see Figure 1).
- In addition, the rural operator STM is extending access using VSAT technology in its licensed region (Eastern Development Region (EDR)).
- These CDMA base stations will be linked by a new backbone network, using fibre, microwave and satellite technologies. By mid-2006, all district headquarter towns will be able to access the Internet at local rates through NT's network.

[1] Source: Nepal Living Standards Survey 2, CBS, December 2004

FIGURE 1 CURRENT NT PLANS FOR PHASE 1 CDMA DEPLOYMENT

3.2 Summary of findings from Review of International Experience

Case studies shown 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.
- In a Rurtel scheme in Laos, a **statistical study** shows that provision of telephony access has a significant positive effect on incomes.
- The Jhai Foundation's **provision of computers to rural schools** in Laos. Some installations are already achieving financial self-sufficiency.
- 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.

- Examples of **e-post implementations** in India and Bangladesh for two-way communications. However, services elsewhere appear to be rather expensive and rely on commercial mailings to break even.
- A **multifunctional item of terminal equipment** (for video, audio and text) currently under development, the PCtvt with a simple user interface suitable for illiterate users. They are worth monitoring through their trial stages.
- India's rapidly growing e-Chaupal system, 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.

3.3 High-level findings of other studies

A recent proliferation of new projects in the international arena means that most are young projects needing at least a couple of years to get set up and start to show useful results. The high-level findings of all the studies support common sense and may seem to state the obvious. For example:

- ICTs are most successful in reducing poverty when they are embedded within effective poverty-reducing strategies.
- 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 infrastructure alone will not do.
- 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 examples from India, which has much in common culturally with Nepal, 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 Centres (Sikkim); Tamil Nilam Touch Screen Project; FRIENDS Kerala; Mahiti Shakti; and Computer-aided Administration of Registration Department (CARD), Hyderabad.
- **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).

3.4 Lessons from using competition for subsidies in rural telecom

This section aims to highlight what we can learn from the growing body of international, and Nepalese, experience on competing for subsidies.

3.4.1 Key factors in a successful approach

Figure 2[2] identifies some key factors behind the success of this approach, when considering its applicability to any infrastructure services.

Demand factors	Supply factors	Enabling environment
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	Several firms are qualified to bid for subsidies Business opportunities are aligned with operators' strategies Project components are cost-effectively packaged	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 coordinate financing policies National infrastructure networks are already relatively developed Institutional capacity is in place to implement and manage a competitive subsidy system

FIGURE 2 COMPETITION AMONG FIRMS FOR SUBSIDIES: CRITICAL SUCCESS FACTORS

We note that some of these factors will be relatively easy to fulfil for ICTs in Nepal (e.g. "services have considerable growth potential"). Others are impossible within the time-frame of this project (e.g. "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.

3.4.2 Experience of other countries

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 Region[3]. We have also considered how Peru's FITEL has been operating since 1996[4]. Below we summarise some points worth noting.

[2] 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.

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

[4] 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 (Fitel),* Osiptel, 2002.

Latin America

- Chile's long and successful history of using competitive tendering for rural telecom 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 cost5.
- Peru's pilot FITEL 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 telecom 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 Cafés, 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:
    - 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.

[5] 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.

- Nepal also has considerable experience of managing subsidies in other sectors. The small subsidies available in the alternative energy sector (see Figure 3), 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.

Alternative Energy Promotion Centre: Government subsidy policies

Micro-hydro: 70,000 NR/kW (3kW to 100kW), plus up to 21,000 NR per kW transportation cost
Solar: 5,600 to 11,500 NR 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.

FIGURE 3 SMALL-SCALE ENERGY SUBSIDIES

3.5 Key findings from workshops

The Expert Workshop and Public Workshop provided invaluable fora for the project team to test ideas, and for building consensus. 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 summarize the new material contributed by these events. Several problems highlighted in the Sector Overview were seen as soluble by appropriate actions by certain lead agencies summarised below in Figure 4.

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
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:

- Competitive bidding for least subsidy is a good approach for sizable infrastructure projects. However, most community owned ICT facilities to be created in a demand-driven fashion may not be suitable for this approach. Small access network facilities may be created under some different subsidy criteria.
- A separate management unit can be created within NTA acting as a secretariat with responsibilities of daily administration and project execution under RTDF, consisting of a board of directors, government and community representatives including operators' representatives, to develop procedures, policies etc. for ICT development, and to monitor and evaluate performance.

	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 for 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

FIGURE 4 ACTIONS RECOMMENDED BY OPEN WORKSHOP

- It was recognised 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 and to insure its optimal use by creating value from the service for the community is even more important. Relevant content development was considered as an extremely important aspect for making ICT access worthwhile for the communities and was felt to be 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.

4 Phase I – A Strategy for Increasing ICT Access in Rural and Peri-urban Areas of Nepal

Based on the background study described in Section 3, strategies developed are presented below.

4.1 Principles

Based on the Nepalese situation and international experience as discussed above, we put forward the following principles as a basis for the medium-term strategy.

- **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, demanding a range of options to cater for the diverse population and to preserve this diversity by permitting production as well as consumption of content.
- **Natural growth:** Every community has to follow a progressive development path. New ICTs must be appropriate to each stage of development. 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. 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:** Community spirit is still strong in Nepal. 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 cooperative 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. 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.

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

4.2 Barriers to ICT take-up

The main barriers to ICT take-up 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 – 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, and 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 satisfy 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. There is still a gap in understanding of 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.

4.3 Pillars of the strategy

4.3.1 Strategic actions required

All evidence from other countries[6] is that if such barriers are lowered, demand will grow, supply will meet demand, and rural ICT take-up will increase. Any successful strategy for increasing access to ICTs in rural Nepal must therefore include the following components:

- **Policy and regulatory reforms:** Implement open licensing as envisaged in Telecom Policy 2004 to allow entry of new operators. 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.
- **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.

[6] As summarised, for example, in our Review of International Experience.

- **Inject cash strategically:** 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 telecom, 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.
- **Mobilise communities:** Integrate the ICT agenda into community mobilisation 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 local language content, use of solar energy to 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.
- **Coordinate and collaborate:** There are many current ICT initiatives which are more or less independent of each other. Coordination could increase effectiveness. ICTs themselves offer excellent tools to help, e.g. 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.

4.3.2 Some alternative community development paths

Figure 5 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.

	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

	Development path	Finance partner	Candidate locations	Remarks
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 coordination 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 (e.g. 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	Incentives existing cybercafés to attract wider clientele and set up new branches to serve marginal groups	Cybercafés	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

FIGURE 5 ILLUSTRATIVE COMMUNITY ICT DEVELOPMENT PATHS

4.4 Universal access objectives for telephone service

4.4.1 Universal access

There is well-established demand for a telephone service in Nepal's rural areas. Unfortunately, Nepal has suffered a period of stagnation (and, in conflict areas, decline) in provision of rural telecom infrastructure. 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 quickly, 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.

4.4.2 National objectives for telephone service

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

By mid-2007: Telephone service, at (or near) normal current NT PSTN rates, available within a week of request, throughout areas covering 85% of Nepal's population, 4% of which will be covered by RTDF.

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 98% of Nepal's population, 3% of which will be covered by RTDF.

Continuing: At least one phone line (PCO) to be installed close to each primary school location. This is accessed by 89.9% of rural population within 30 minutes, by 97.5% within one hour, 99.8% within 2 hours (NLSS II).

4.4.3 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 telecom discussed in Section 4.6. 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 its CDMA and Internet coverage plans annually by the end of each fiscal year, showing in detail the boundaries of expected service availability by mid-2007. Longer-term plans (in outline) to be available to NTA, and to the public if requested (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, NT should be encouraged to fulfil or exceed these roll-out plans, which are long due. Such may be taken as its obligation, based on the monopoly rights it is enjoying in long distance and international telephone services.
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.
5. Beneficiary communities may well group together to get the best value telecom service using their subsidy funds. NTA (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 local entrepreneurs using new cost-effective technology and 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. Any new operations formed by this process would 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.
6. Once phone lines are available on demand, 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) if the private sector does not respond with a similar service.

4.5 Objectives for public Internet access points

Demand for Internet service in rural Nepal is still very low. However, roll-out of rural telephone networks will also provide Internet-capable infrastructure. Internet access requires "only" 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.

Internet is needed in all District Headquarters for administrative reasons. In order to facilitate growth of 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).

4.5.1 Objectives for Internet access

Therefore, the objectives may be framed along 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.

Terrain type	To cater for 50% VDCs of district ("First round"?)	To cater for 75% VDCs of district ("Second round"?)
Mountains	DHQ plus 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

We feel that at the moment that no more than this can be justified as a universal provision. Of course, in many areas greater provision will be achieved by market forces.

This provision could be in many forms. For example, the Post Office may introduce e-post points; a school or college with Internet access, an Agricultural Information Office or a community radio base station may offer Internet access to the public. It is up to the DDC to monitor what is available and what else is needed.

4.5.2 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 or early 2006, each district should identify and publish first and second round RMCs (for public Internet access points by 2008 and 2010 respectively). In each DDC,information officers 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.
6. In 2007, the NTA, 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.

4.6 Institutional arrangements

The Telecom Act stipulates that Nepal Telecom Authority (NTA) is entirely responsible for creating and disbursing the Fund for Rural Telecom Development. This will remain the case as far as telecom facility developments in commercially unviable rural areas are concerned. However, NTA is required to implement part of the ICT project developed in the current study with IDA credit available for this purpose under TSRP. Looking ahead, however, we recommend that NTA should be prepared to pass on the responsibility of managing the implementation of the ICT project other than the telecom facility during the main period of expansion of rural ICT access (this could be the next decade or more).

5 Phase II – Pilot Project Design

5.1 Introduction to Phase II activities

This phase of the study in accordance with the terms of reference included the following:

- **Pilot project design** includes appropriate zoning and determining of objective service levels, analysing the possibility of expanding points of presence, designing commercially viable ICT projects such as telecentres to be expanded nationally, and prioritising the projects and preparing methodology and ToRs for the demand study to follow.
- **Demand study** to be carried out has the main objective of a thorough survey of selected locations (where pilot projects are to be implemented), which will produce a detailed description of expectations for services in the rural and under-served urban areas, the potential demand for new services, and technical, legal and business constraints for the delivery of additional services.
- **Demand modelling report** has been written as an additional contribution from the Consultant to Demand Study part of the work.
- **Design of bidding process** includes design of bidding documents necessary for the projects, preparation of regulatory structure of RTDF and its organisation and procedures and RTDF manual. We have also included preparation of a draft IFDF (ICT Facility Development Fund) manual.

5.2 Region-wise objective service levels for telephone and Internet

5.2.1 Categorisation of districts in regions

Starting from the national objective of service levels (telephones and Internet), we proceed to estimate the service levels for each region categorised on the basis of population density. Each region, not necessarily contiguous, consists of districts with population densities within a certain range (Table 3).

TABLE 3: CATEGORY (REGION) OF DISTRICTS IN ACCORDANCE WITH POPULATION DENSITY RANGE

SN	Category of region	Population density range of districts in the region	Number of districts	Mountain districts	Hill districts	Terai districts	Remarks
1	A	4–12	5	5	0	0	
2	B	33–65	12	9	3	0	
3	C	80–150	17	2	15	0	
4	D	151–196	16	0	12	4	
5	E	204–277	9	0	5	4	
6	F	319–817	14	0	1	13	
7	G	1895–2739	2	0	2	0	Capital
8	Totals		75	16	38	21	

Population density = persons per square kilometre

5.2.2 Region-wise targets for PCOs

Targets for PCOs to be developed under the subsidy network are given in the eighth column of Table 4 by category of district, ranging from 50% of the total required PCOs in region A to none in region G.

A large proportion of PCOs would come in the private sector, either franchised by NT or operated by themselves. It is assumed that in region A, consisting of mountain districts, about 50% may need subsidy while in the easier regions it will be as low as 10%. Category G, the capital city, will not require any PCO with subsidy. PCOs under subsidy will have to be established in NT's CDMA network as well as in the new network to be created by NTA with subsidy. Of all the PCOs to be established with subsidy, the number of PCOs in the NTA-created new network are assumed to be in proportion to the population covered by that network and the rest will lie in NT's CDMA network. Under region A, Table 4, column 6 gives the total of PCOs needed in that region. Twenty per cent of these (covering 20% of the population as given in column 5) will be in the NTA-created new network (shown in column 9). The figure representing the difference between column 8 and column 9 is the number of PCOs in NT's CDMA network which require subsidy. It is assumed that the NTA-created new network under subsidy will be a VSAT network on the basis of one PCO per terminal.

TABLE 4: NETWORK COVERAGE BY 2010 BY NT AND UNDER SUBSIDY (RTDF), & ESTIMATE OF PCOS REQUIRED UNDER SUBSIDY

Category of Region	Number of districts	% of pop. covered by NT by 2010	% of pop. covered in national target by 2010	% of pop. covered with subsidy network	Number of PCO locations	% of PCOs requiring subsidy	Number of PCOs requiring subsidy	PCOs under the network created with subsidy	Subsidised PCOs under the NT's CDMA network
A	**5**	70	90	20	**529**	50	265	106	159
B	**12**	80	93	13	**2657**	40	1063	345	718
C	**17**	85	95	10	**6373**	25	1593	637	956
D	**16**	90	98	8	**5596**	15	839	447	392
E	**9**	95	100	5	**4320**	10	432	216	216
F	**14**	100	100	0	**4981**	10	498	0	498
G	**2**	100	100	0	**1282**	0	0	0	0
Total	**75**	93	98	5	25738		4690	1752	2938
Costs of PCOs in $								8,760,708	734,465
Costs of PCOs total $			9,495,173						

Assumptions

- Population % to be covered by subsidy network contains number of PCOs in proportion to population
- All the PCOs are to be established by VSAT network.
- Each PCO requires one VSAT terminal
- If NT is allowed to extend CDMA network under subsidy this subsidy requirement will decrease substantially
- VSAT terminal cost is assumed to be $5000; PCO in CDMA network is fixed wireless set and solar power costing $250

5.2.3 Region-wise targets for public Internet access points (telecentres and cybercafés)

NT's CDMA network will have Internet dial-up facility. NT is also planning to establish district satellite communication systems to provide connectivity for telephone services as well as Internet by the year 2006 to those districts where microwave links are not available. In view of foreseeable low demand of Internet services in DHQs and rural areas, the following regionwise targets were recommended (Table 5). Public Internet access points are defined as telecentres to be provided on subsidy under community ownership to rural market centres and privately owned cybercafés in the DHQs with some government incentives.

TABLE 5: GROWTH OF PUBLIC INTERNET ACCESS POINTS IN DHQS AND RMCS

SN	Category of Region	Population Density (psqkm) Range	Mountain districts	Hill districts	Terai districts	By 2006 in DHQs	By 2008 in RMCs	By 2010 in RMCs	Total PIAPs per district	Total PIAPs
1	A	4–12	5	0	0	1	0	1	2	10
2	B	33–65	9	3	0	1	1	2	3	36
3	C	80–150	2	15	0	1	2	3	4	68
4	D	151–196	0	12	4	1	2	4	5	80
5	E	204–277	0	5	4	1	2	5	6	54
6	F	319–817	0	1	13	1	2	6	7	98
7	G	1895–2739	0	2	0	Several	Several	Several	Several	–
8	Totals		16	38	21	73 +several	124 +several	273 +several		346

5.3 ICT projects, pilot projects and implementation modalities

In the following sections we will present ICT projects other than telecentres or cybercafés that are important for increasing ICT access to the rural communities in particular. Capacity building facilities in rural areas such as provision of computers with Internet access to schools, and proven cost-effective communication media such as community radio for community development, are also proposed to be taken up on a longer term basis.

For increasing Internet Point of Presence in the rural areas, a regulatory instrument to permit any user to access their choice of ISP located within a development region at local dial-up rate and other incentives for small ISPs would go a long way. Therefore, we have currently recommended only one type of assistance, to ISPAN for expanding Internet switching in the regional centres.

In the pilot phase, all the project components, cybercafés, telecentres, computers and Internet for schools, including regional Internet switching, are proposed to be taken up for implementation, while community radio will have to wait for some time. The telephone infrastructure project (PCOs included) to be provided with RTDF can wait for a year or two as massive CDMA and district satellite network expansion of NT is under implementation now.

5.3.1 Cybercafés in DHQs

Cybercafés are proposed as private entrepreneur owned multifunctional businesses with the view to making them viable in a small town. Primarily aimed at providing Internet access facility, they can be made capable of providing computer hardware, software maintenance, and training in applications and use of computers. The reason to combine all these functions in one unit makes good business sense in a DHQ, while demand for particular ICT-related service is small. The various ICT projects planned to be launched in the districts would greatly benefit from such services being close at hand.

Modalities of working in establishing cybercafés in DHQs

The following modalities could be adopted while working in collaboration with RUPP (municipality) in establishing cybercafés in DHQs during the pilot phase. However, in the longer term collaboration will be required with DLGSP (DDC) as well because of their presence in all the districts. NTA is advised to work with DLGSP in the districts where RUPP is not present.

- Municipalities and TLO will be informed about the purpose of the cybercafés and the basic requirements as to how they could function.
- RUPP/TLO will nominate an appropriate person who is a member of the TLO willing to establish and run a cybercafé in the municipality (DHQ).
- In the DHQs, entrepreneurs or their staff will be trained, at a cost to the project, on operation and basic maintenance of computer hardware/software and running of cybercafés in the pilot phase.
- If required, a small loan will be provided to the entrepreneur, under the terms and conditions applicable in lending from the fund instituted by the RUPP/MLD, on the usual terms applicable for such loans in the TLO.
- RUPP/municipality will monitor the progress of the project.

5.3.2 Public Internet access points (telecentres)

Telecentres aimed primarily at providing Internet access in RMCs are proposed to be established, utilising useful lessons learnt from the earlier telecentre projects in order to make them sustainable.

Operational modalities of telecentres

- The TLOs in RMCs and municipalities will be informed about the purpose of the telecentres and the basic requirements as to how they could function. The information will also include the longer term objectives and strategies of ICT development in rural and peri-urban areas and how RMC, municipalities and DDC could contribute. RMC and DDC will participate in the preparation of the annual plan.
- The TLO in the RMC will nominate members from the community and form a *telecentre user committee.*
- The telecentre user committee will nominate one person initially to manage and operate the telecentre.

5.3.3 Computers and Internet for Schools Project

This project will try to bridge the digital gap between those students who attend private schools with computer and Internet facilities and those who attend government schools without such facilities. The strategy workshop also emphasised that introducing computers in schools would be the single most important step in the direction of building capability to use and benefit from ICTs in rural areas. Table 6 gives the number of schools covered by the project.

TABLE 6: SECONDARY AND LOWER SECONDARY SCHOOLS (2004)

Types	Secondary school (ss)	Students	Students/ss
Aided	2291	429978	188
Unaided	967	79301	82
Total	3258	509279	156
Institutional (private schools)	1289	34485	27
		Lower secondary	
Aided	3759	1042617	277
Unaided	1905	253678	133
Total	5664	1296295	

Objective and targets

Provide 80% of lower secondary schools and 100% of higher secondary schools and above with computers and Internet by the year 2015.

1. **Target 1:** By 2007, provide computers to secondary schools or higher wherever there is electricity supply and local competence and interest. This target is divided into sub-targets:
   a. **Sub-target 1.1** (**pilot phase):** In the pilot phase, the high schools will generally be chosen in those districts where cybercafés are being established in the DHQs and market centres are being provided with PIAPs. About 20 schools in each district will be taken up. This will be implemented within a year (2005–06).
   b. **Sub-target 1.2 (year 2006):** 160 schools under the pilot project.
   c. **Sub-target 1.3 (year 2007):** 320 schools under the normal project.
   d. **Sub-target 1.4 (year 2008):** 640 schools under the normal project; the majority of these will be in the Kathmandu Valley.
2. **Target 2:** By 2008, provide Internet access on request to schools already equipped with computers. The implementation of this target will take place simultaneously as computers are installed in schools in areas where Internet is available, or Internet access will follow as connectivity becomes available.
3. **Target 3:** By 2009, provide computers and Internet access to 25% of secondary schools, using solar power where no electricity is available. This target is to be fulfilled in the period 2008–09.

4. **Target 4:** By 2012, provide computers to 90% of secondary schools. By the year 2012 secondary schools will have more than 5 computers per school than originally provided
5. **Target 5:** By 2015, provide 100% of secondary schools and, say, 80% of lower secondary schools with computer and Internet access. By the year 2015 nearly all students down to lower secondary level should have access to computers for educational purposes.

Modality of implementation of Computers and Internet for Schools Project

Five computers per school are hardly adequate compared with the number of students. As the cost of the project with entirely new equipment would be very high, it is proposed to start with used – though not outdated – equipment. In the beginning, the project will obtain donations from International NGOs. Later, it may be possible to supplement these with locally donated equipment. The implementation of this project will be extensive and on a demand driven basis. In order to kick start with a substantial volume of operation, NTA is advised strongly to work with national NGOs with experience in this type of work. Alternatively, computers can be bought locally using available IDA credit, which is the preference of the World Bank.

In summary, the following modality of working is to be adopted if NTA chooses to work with donated equipment. The working relation with a national NGO will still be maintained.

- NTA shall work with one selected national level NGO.
- NTA will provide the funds necessary to import used computers for the project.
- The NGO will manage the entire project:
  - Import of equipment, safe keeping during the progress of work, purchase of all locally procured components of the equipment required for installation
  - Refurbishing, if required
  - Communicating with district authorities for selection of schools, for monitoring after the installation is complete, and ensuring that courses start in the schools
  - Collecting the required contributions from schools for meeting some part of the project costs
  - Ensuring equipment is installed and teachers trained.
- A tripartite MoU among the International NGO which provides the computers, the national NGO and NTA will be drawn up. Each entity will bear their respective responsibility and obligation within the project.
- The national NGO will also develop local NGOs, wherever possible, and divide the implementation responsibility among them.
- DDCs, DEOs and VDCs will have to report annually the progress made by the schools in computer education.
- The project will provide Internet connectivity when it becomes available and will pay some amount for the first year.

5.3.4 Community radios

There are 56 FM radio licensees including Radio Nepal, out of which 46 are operational. Thirty-six of these stations are commercial whereas 16 are community radios. The CR of Madan Pokhara (CRM) has focused on 23 VDCs and one municipality, though service covers 65 VDCs. It is estimated that CRM has about 500,000 listeners, and has extensive people's participation. The general assembly of a community radio (e.g. CRM) comprises representatives of listeners, community and grassroots organisations, professional organisations, friends of CRM, life-members and intellectuals. Programmes include discussion on local issues and development news of local interest. Entertainment and promotion of local culture are also among its main objectives.

By 2010, 25 community radio stations are to be added to ensure reasonable geographical distribution and population coverage throughout the country. Five community radios should be established each year for the coming five years. Piloting of this item is not necessary. *It is recommended that NTA work with the Association of Community Radios for this implementation.* Criteria for selection and provision of assistance and monitoring of the entire project can be easily developed through this association or the community radio support unit of NFEJ.

5.3.5 Regional Internet exchanges facilities under ISPAN (nPIX)

There is growing need for exchanging traffic among users of services of national ISPs locally. This project component is aimed at extending the peering arrangement among ISPs including in other major towns besides Kathmandu. nPIX (ISPAN) is an association of ISPs working to build Internet switching facilities in the country. So far nPIX (ISPAN) facilities have been built using donations. Therefore, it is proposed that nPIX (ISPAN) be helped for developing some local switching facility and training small ISPs to enhance their capacity to understand the BGP technology and to be able to peer. This project includes equipment provision and installation, training the ISPs and some wage allocations.

Modalities of implementation

As long as local competitive bidding is adopted in the project for services and equipment, payment for these items could be done directly to the bidders on the basis of their performance. Payment for wages and other items may have to be borne by nPIX (ISPAN) from some other resources. Therefore, it is recommended that nPIX (ISPAN) performs its task through local competitive bidding.

5.4 Basic considerations for pilot project design

5.4.1 Purpose of the pilot project

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

- Demonstrating a variety of successful ICT development paths (such as some of the illustrations in Section 6.2 of the strategy report, 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.

5.4.2 Clustering of project components district-wise

With the decentralisation of authority of line ministries and devolution of political power the districts have become very important units for local level development activities. The implementation of all project components of ICT on a district basis has the following purposes and advantages:

- If rural ICT projects belong to the district level, they can fit in the total scheme of planning and implementation in which DDC and concerned VDCs are involved.
- By clustering ICT projects district-wise, sizable work opportunity can be generated. This will be conducive for development of local entrepreneurship to provide computer related hardware and software services. It will also create local employment and reduce the cost of ICT implementation, thus contributing sustainability to ICT projects.
- For projects to be sustainable, it is necessary that the operation, maintenance and supply of hardware and software services are close at hand for ICT projects and services. The logical location of such facilities for VDCs of a district is its DHQ.
- Districts are required to develop the capabilities for implementation, operation and support of ICT related projects in the private sector and NGOs as well as in the public sector. This is particularly lacking in the small DHQs. Through DLGSP, capacity of DDCs is being enhanced; similarly through RUPP, a number of partner municipalities have developed information centres at DHQ/municipal levels and telecentres at the RMCs. Therefore collaboration with RUPP (municipality) and DLGSP (DDC) in creating public Internet access facility at DHQs and RMCs by clustering on district basis will be very advantageous in reducing the cost and effort of implementation and supervision of the projects.

5.4.3 Selection of districts for pilot project

The districts chosen for pilot projects are eight in number, namely Ilam, Dhankuta, Gorkha, Dang, Bardia, Surkhet, Doti and Kanchanpur. In the pilot project, an effort will be made to create demand for cybercafés in DHQs (municipalities) and telecentres in RMCs of these eight districts. In the pilot phase, these districts were chosen to take advantage of the existing information centres and telecentre project management capabilities developed in the DHQs / municipalities under RUPP. We are already witnessing the birth of cybercafés in a number of DHQs since the introduction of local dial-up rates in October 2004. In three districts (Dhankuta, Bardia and Doti), cybercafés have not come up yet in DHQs.

TABLE 7: DISTRICTS WHERE CYBERCAFES AND TELECENTRES ARE PROPOSED

District	DHQ	Existing DHQ cybercafé	Pilot project DHQ cybercafé	Pilot project RMC telecentre
Ilam	Ilam	Yes	No	Early, if supported locally
Gorkha	Gorkha	Yes	No	Early, if supported locally
Dang	Ghorahi	Yes	No	Early, if supported locally
Surkhet	Birendra Nagar	Yes	No	Early, if supported locally
Kanchanpur	Mahendra Nagar	Yes	No	Early, if supported locally
Bardia	Guleria	No	Yes	Early, if supported locally
Doti	Silgadhi	No	Yes	Early, if supported locally
Dhankuta	Dhankuta	No	Yes	Early, if supported locally

Regional Internet switching facilities are proposed at Biratnagar, Pokhara, Bhairahawa/Butwal and Nepalgunj. Another two sites that nPIX may consider after further examination are Birgunj and Dhangadi. This component is largely independent of the rest of the pilot project.

5.5 Cost estimates for the full ICT programme (2005–2010)

In order to arrive at the cost estimates for the proposed full ICT programme, estimates of individual projects were worked out initially. A summary of these costs is presented in Table 10, all of which represents the subsidy required for the period 2005–2010 in ICT. The cost estimates for the project components for the pilot project phase are presented in Section 5.5.5 and Table 11.

5.5.1 Cost estimates of PCOs under subsidy (RTDF)

Here it is assumed that the network created with RTDF will be the VSAT network which is coming to the fringe areas where population is to be covered by PCOs alone. One terminal is needed per PCO in the VSAT network, subsidy for which is estimated at $5000 (terminal or PCO). PCOs requiring subsidy to be located within NT's CDMA network will only require terminal equipment (CDMA set) to be provided under the subsidy. This is estimated at $250 per site. Table 4 gives the details of the calculation. The total cost estimate of the VSAT network (PCOs included) and PCOs in NT's CDMA network is US$9,495,173.

5.5.2 Cost estimate of cybercafés in DHQs and telecentres in RMC

Table 8 presents an estimate of the total cost for the Internet access facilities given above in Table 5. The unit cost applied in the pilot phase is based on the present suggestions where RUPP is proposed to be one of the collaborating partners. Installation cost is not included in the estimates. Therefore, the cost beyond pilot project includes slightly higher per unit figures. The total cost of the Internet access facilities is estimated to be Rs. 87,783,120.

TABLE 8: TOTAL COST ESTIMATES OF CYBERCAFES AT DHQS AND TELECENTRES AT RMCS

Description	Unit price	Cost of cybercafés at DHQs and costs of telecentres at RMCs all in Rs.					Total cost
		Numbers	Pilot project cost	Cost in 2006/2007	Cost added 2007/2008	Cost added 2009/2010	
1.0 Cybercafes by in DHQs							
1.1 In private sector (training on management + computers)	33,000	15		495,000		–	495,000
1.2 In private sector but more assistance including training	60,000	24		1,440,000		–	1,440,000
1.3 No help required	-	10		–		–	
1.4 pilot		3	included in 2.2				
2.0 Telecentres by 2008							
2.1 Telecentre establishment & one year cost	312,000	113			35,256,000	–	35,256,000
2.2 Pilot lump for 13 telecentres	**4,104,120**	1 lot	**4,104,120**				**4,104,120**
3.0 Telecentres added by 2010							
3.1 Telecentre establishment & one year cost	312000	149				46,488,000	46,488,000
3.2 Support costs							
			4,104,120	1,935,000	35,256,000	46,488,000	87,783,120

Assumptions:

1. Training costs are higher in future because it will be a little more than what is included in pilot
2. Telecentre training costs are also slightly higher if RUPP is not assisting beyond pilot

5.5.3 Cost estimates of other projects

Community radio

The projects can be implemented on a cost sharing basis. A contribution of about $20,000 from the project per community radio station will be required. The total cost to the subsidy would be about $500,000 for 25 community radios up to the year 2010.

Computers and Internet for Schools Project

The cost for this project has been recalculated as below based on the costs given in Annex-9 of the Pilot Project Design Report. Here it has been assumed that the schools will not bear any cost from the year 2009 onwards, as the schools participating in the project beyond year 2008 are assumed not to be able to bear expenses due to their conditions.

TABLE 9: COST FOR COMPUTERS AND INTERNET FOR SCHOOLS PROJECT

	2006	2007	2008	2009	2010	2006–2010
Number of higher secondary schools covered	160	320	640	640	640	2400
Computer sourcing, administrative, testing, packaging to be sent to WCE and CAI Overseas	3,800,000	7,600,000	15,200,000	15,200,000	15,200,000	57,000,000
International and national ocean and land shipping	932,000	1,864,000	3,728,000	3,728,000	3,728,000	13,980,000
Training and local capacity building	800,000	1,600,000	3,200,000	3,200,000	3,200,000	12,000,000
Borne by schools (Administration, installation, additional parts and printers and equipment, follow up etc.)	4,625,600	9,251,200	18,502,400	–	–	32,379,200
Others/contingencies	480,000	960,000	1,920,000	1,920,000	1,920,000	7,200,000
Total Costs	**10,637,600**	**21,275,200**	**42,550,400**	**24,048,000**	**24,048,000**	**122,559,200**
Borne by the project						**90,180,000**

Regional Internet switching

Only a one-time cost of Rs 613,800 is necessary for equipment installation and some training.

5.5.4 Summary of subsidy estimate for the full ICT programme (2005–2010)

In this section the summary of subsidies which may be required in the next five years are presented. The Computers and Internet for Schools Project depends on the contribution of schools for almost half of the cost in the early part of the project. However, it will be more difficult to find the schools' contribution at the later part of the project as more unaided (by government) schools are included. Therefore more subsidies are foreseen in later years for the schools.

TABLE 10: SUBSIDY REQUIREMENTS IN THE NEXT 5 YEARS FOR THE ICT PROGRAMME

Description of the ICT component	Costs for (2005–2010) Rs.	Costs for (2005–2010) $
Subsidy for PCO and network	674,157,283	9,495,173
Public Internet access points (cybercafés in DHQs & telecentres in RMCs)	87,783,120	1,236,382
Computers and Internet in schools	90,180,000	1,270,141
Community radios	35,500,000	500,000
Regional Internet switching	613,800	8,645
Content development	71,000,000	1,000,000
Total ICT activities	**959,234,203**	**13,855,471**

5.5.5 Summary of the pilot project cost

The summary of the pilot project cost as estimated in Annex-10(C) of the Bidding Process Design report is given in Table 11. The costs of other collaborating agencies and partners and the administration and management costs of the project are not included in the summary.

TABLE 11: SUMMARY OF PILOT PROJECT COSTS

S.N.	Project component	Cost in Rs.	Remarks
1	**Cybercafés in DHQs**		
	Training of 3 persons for 3 cybercafés		Included in 2.1
2	**Telecentres for maximum of 13 including 5 in institutions**		
	2.1 Training cost for telecentre and cybercafés	228,720	
	2.2 Telecentre equipment cost	3,588,000	
	2.3 Telecentre operation cost only for 8, not for institutions (Rs 24000/per centre)	192,000	
	2.4 One year Internet cost only for 8 as above @ Rs 12000 per annum per centre	96,000	
	2.5 Equipment installation cost by RUPP	–	RUPP cost not shown
	2.6 Post installation supervision and monitoring and support by RUPP	–	RUPP cost not shown
	Subtotal	**4,104,120**	**Borne by the project**
3	**Computers and Internet in schools**		
	3.1 Ocean transport, admin and refurbishing cost of computers for 160 schools	**4,138,590**	**borne by the Project**
	3.2 Cost of local purchases, installation, training, and project management	4,674,000	Borne by schools
	3.3 Cost borne by schools for accommodation, furniture, and wiring and travel and living cost by schools	–	Not shown
	Subtotal	**8,812,590**	
4	**Regional Internet exchanges by npIX**		
	4.1 Cost of infrastructures for switches in five locations	597,000	
	4.2 Cost of training of ISPs in 8 places	16,800	
	Subtotal	**613,800**	**Borne by the project**
5	**Total pilot project cost borne by the project**	**8,856,510**	

5.5.6 Time Schedule of pilot project activities

The time schedule is presented in Table 12.

TABLE 12: TIME SCHEDULE OF THE PROJECTS

s.n.	Project and Activities	Months/1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	**AA. Cybercafes in DHQs**														
	1. MoU between NTA and RUPP	X													
	2. Info-social mobilisation in DHOs by RUPP	X	x												
	3. Selection of private entrepreneur		x	x											
	4. Loan arrangement By CBO/RUPP			x	x										
	5. Trainer selection			x	x										
	6. Training of entrepreneurs					x	x	x							
	7. Establishment of cybercafé				x	x	x	x							
2a.	**BB.1. Telecentres in RMCs**														
	1. Info-social mobilization	X	x	x											
	2. Formation of user committee	X	x	x											
	3. Selection of telecentre operator/manager	X	x	x	x										
	3. Selection of trainer				x	x									
	4. Training of telecentre operator					x	x	x							
	5. Purchase of hardware software			x	x	x	x								
	6. Installation of hardware software						x	x	x						
	7. Reports of commissioning							x	x	x					
2b.	BB.2 Telecentres in institutions														
	1. MoU between NTA and the institutions	X													
	2. Selection of the sites		x	x											
	3. Purchase of hardware software			x	x	x	x								
	4. Selection of trainer				x	x									
	5. Training of telecentre operator					x	x	x							
	6. Purchase of hardware software			x	x	x	x								
	7. Installation and commissioning						x	x	x						
3	**CC. Computers and Internet in schools**														
	1. Selection of national NGO to work with	X	x	x											
	2. MoU between NTA and international NGO			x	x										
	3. Selection of schools (NNGO)			x	x	x	x	x							
	4. Ordering of the equipment				x	x									
	5. Equipment arrival						x	x	x						
	6. Local purchases (NNGO)							x	x						
	7. Selection of trainer/s						x	x	x						
	8. Teachers and training								x	x					
	9. Readying schools for receiving the equipment						x	x	x						
	10. Installations								x	x	x	x			

	11. Reports of commissioning									x	x	x	x		
4	**DD. Regional Internet exchanges by NPIX**														
	1. MoU between NTA and nPIX			x											
	2. nPIX to submit bidding docs to NTA				x	x									
	3. nPIX procures equipment/software						x	x	x	x					
	4. nPIX gets equipment installed										x	x	x		
	5. nPIX procures training service								x	x					
	6. Training of ISP on BGP technology for peering									x	x	x			
	7. Commission of the equipment													X	
	8. Completion reports														x
		1	2	3	4	5	6	7	8	9	10	11	12	13	14

6 Phase II – Demand Study

6.1 Terms of Reference, methodology and sample survey for Demand Study

6.1.1 Terms of Reference

For convenience, Box 1 below reproduces the passage from the Terms of Reference which describes the demand study, with the original bullet points numbered and in some cases split.

Box 1 Extract from Terms of Reference for Demand Study

The demand study will be based on a thorough survey of selected locations, as described below, which will produce a detailed description of expectations for services in the rural and under served urban areas, the potential demand for new services, and technical, legal and business constraints for the delivery of additional services [copied below as not otherwise covered]. The potential level of telecommunication and information services utilisation in Nepal should be described in detail based on a demand study including three different scenarios (urban, semi-urban and rural). Each scenario should include at least three surveys of the most populated areas within each scenario, according to the National Census. Utilisation estimates will include a prioritisation of telecommunication needs, such as:

1. Priority customers, such as administrative centres, hospitals, police stations, post offices, Internet service providers, schools, businesses, etc.;
2. Appropriate extension and connections to the national backbone network;
3. Analysis of the users' payment ability and
4. the types of demanded services;
5. Required service levels and transmission capacity for towns and villages in different sizes, segments, and/or at different levels in the administrative hierarchy, based on
6. estimates of demand for different services, from voice to Internet access;
7. Appropriate policy targets for the desired service levels, such as minimum acceptable distances (in km or hours of walking) from the nearest public communication point, numbers and sizes of villages/towns for which it is achievable to have at least one payphone and/or one telecentre within a specified number of years, as well as
8. Estimated cost of this deployment;
9. Technical, legal and business constraints for the delivery of additional services.

6.1.2 Methodology

The above requirements were fulfilled by following different types of activities:

1. Exploitation of existing relevant survey results relating to households' telecom demand (from the National Living Standards Survey II and the APT/SECEN study), supplemented where necessary by further similar household surveys and surveys of business/institutional users. These give a good idea of existing usage patterns.
2. Acquisition of local records of commercial and institutional establishments and their ICT use, for example from DLGSP, Chambers of Commerce and Nepal Telecom.
3. Discussion groups of local people and in-depth interviews with business and professional people in each locality. These are the best tool for finding out about likely future demand and perceived constraints.
4. Discussions of network design with technical experts, including those from Nepal Telecom.
5. Subsequent analysis of findings, combined with earlier project findings.

Table 13 shows how each type of activity contributed towards fulfilling each requirement ("yes" means that this activity contributes to fulfilling the requirement).

TABLE 13: ACTIVITIES TO FULFIL REQUIREMENTS OF TOR

	A Existing/new surveys	B Local records	C Discussion groups, depth interviews	D Technical discussions	E Analysis	Comment
1. Priority customers		Yes	Yes	Maybe		Closely related to pilot planning
2. Backbone extension				Yes	Yes	
3. Users' payment ability	Yes		Yes		Yes	Already well surveyed
4. Future service demand	Useful findings already from APT/SECEN		Yes			
5. Service levels and capacity				Yes	Yes	
6. Service demand					Yes	Aggregation and projection of demand findings
7. Policy targets			Yes		Yes	Already proposed nationally, discuss local applicability
8. Costs of achieving targets					Yes	Estimates to follow rest of work
9. Constraints			Yes		Yes	Constraints already set out in strategy, discuss local validity
10. Comment	New work should focus on business users	Straight forward	Most new value here			

6.2 Field work and analysis carried out

6.2.1 Areas selected for Demand Study

The field work consisted of visiting:

- Four municipalities, namely Mahendra Nagar (in Kanchanpur district), Ghorahi and Tulsipur (in Dang district) and Ilam (in Ilam district) as urban centres. Tulsipur municipality was visited because Narayanpur market centre chosen belonged to Tulsipur municipality.
- Two market centres in each district. These market centres (VDCs) were Chandani (Chandani VDC) and Babathan (Dodhara VDC) in Kanchanpur, Lamahi (Chailahi VDC) and Narayanpur (Narayanpur VDC) in Dang district and Biblyate (Barbote VDC) and Fikkal Bazaar (Fikkal VDC) in Ilam district. Chandani and Dodhara VDCs were substitutes to earlier proposed Jhalari and Dajee VDCs due to prevailing security situations as guided by the municipality (RUPP) in Mahendra Nagar.

The survey area selected from each market centre was along the lines of the ToR, that is, the core area of the VDCs. These core areas are called market centres. Wherever the municipality had fixed the rural market centre under the RUPP programme, the area was well delineated and included a well defined number of households. The households included for the survey included also some from the periphery of the actual market. The four rural market centres chosen from Kanchanpur and Dang districts belong to this category. The two market centres of Ilam had not yet been formally chosen as RMCs by Ilam municipality and the numbers of households that belong to these market centres have not yet been determined.

6.2.2 Fieldwork

The field work consisted of the following:

- Collection of latest available municipal profile (information) from three municipalities at DHQs of the districts concerned.
- Collection of data of market centres (VDCs) as available.
- Household survey of a number of sample households ranging from 88 to121 in number from each of the six market centres (core market area of VDCs), to supplement the information that was already available from the CCI or municipalities.
- Collection of historical telephone demand data from Nepal Telecom.
- Collection of data related to cybercafés and computer training facilities in the municipalities.
- Collection of data on Internet service from ISPs (mainly NT) in the municipalities concerned.
- Carrying out group discussions in the municipalities and the market centres of the VDCs. In each municipality, two groups were formed for discussion: one consisting of businessmen, teachers, government officers, journalists and NGO leaders, termed as the 'professional group'; and the other consisting of younger people, students and younger professionals, termed as the 'youth group'. In Mahendra Nagar municipality one additional group of TLO members, with the majority belonging to the Dalit community, was also formed.
- In each market centre one group of businessmen, school teachers, NGOs, TLO leaders and farmers was formed for discussion.
- A limited number of questionnaires was distributed to respondents of the discussion groups in the municipalities to obtain information to determine ICT use and future demand expected.
- Discussion with local in-charge of NT in the municipalities to determine the supply and demand situation, the status of the physical telecom network and service quality.
- Further discussion with infrastructure planners of NT.

6.3 Conclusions of discussion groups and analysis of survey data

Based on information obtained from municipal profiles and description of rural market centres, summary descriptions of three municipalities and their six market centres were written up. Similarly, from discussion groups, information about their ICT needs and their opinions of

demand for telephones in municipalities and the VDC of surveyed market centres were obtained. Opinions on demand for computers and mobile phones for municipalities were collected from the discussion groups formed in the municipalities. Analysis of the survey data and conclusions are all presented in detail in the *"Demand Study Report Volume I*".

6.4 Demand projections

6.4.1 Telephone demand projection of locations surveyed

Demand projection of telephones has been attempted in two ways:

- One based on the historical data of telephone connections and waiting list of Nepal Telecom.
- The other based on a survey of locations, which included:
  - collection of data about the locations
  - conclusions of discussion groups formed
  - specific ICT data collected from the respondents of the discussion groups
  - data collected from household survey of RMCs.

Estimates based on information gathered from discussion groups

Information was gathered in the following two ways:

- In the first case, opinion of discussion groups on likely demand for telephones in the locations concerned was collected. This procedure was adopted in all locations, municipalities as well as rural market centres.
- In the second case, response was sought from respondents in the questionnaire to determine ICT demand. This method was only applied to the municipalities.

In the first case, the reasonableness of opinions expressed in groups about the demand was examined further by household survey analysis in the case of RMCs. Based on conclusions of household surveys conducted, demand for telephones was estimated as a percentage of the households likely to have telephones.

For municipalities, the questionnaire was designed to obtain estimate how many years it would be before 50% of households and 100% of business would need telephones. Analysis showed that personal responses in the questionnaires reflected slightly lower demand for telephones compared with what was collectively shared in the groups. Combining the households' demand for telephones as expressed in the opinions with that of demand of business, the average total demand expressed in terms of percentage of households requiring telephone seems quite reasonable.

TABLE 14: OPINIONS DURING THE DISCUSSION IN GROUPS ABOUT TELEPHONE DEMAND

Locations / groups	Mixed group(RMCs)	Professionals	Youth	Dalit group	*Estimated By the study*
Babathan	1/3 of households				25%
Chandani	25–30% of house holds				25%
Lamahi	30–35 % of households				35%
Narayanpur	30% of households				30%
Biblyate	35–40% of households				35%
Fikkal	35–40% of households				40%
Mahendra Nagar		50% of households	X	PCOs needed	50%
Tribhuwan Nagar		50–60% of households	X		55%
Ilam		60–70 % of households	X		60%

Estimates based on replies of respondents of discussion groups in municipalities

The opinion of the respondents of discussion groups about the telephone demand is summarised in Table 15. There is a prevailing view that 50% of households and 100% of the businesses would take up the telephone within a year if it were available.

TABLE 15: TELEPHONE DEMAND AS EXPRESSED BY THE RESPONDENTS OF THE DISCUSSION GROUPS

	Mahendra Nagar				Tribhuwan Nagar				Ilam			
	Professional		Youth		Professional		Youth		Professional		Youth	
Opinion/ telephone demand	50% of HH	100% of business	50% of HH	100% of business	50% of HH	100% of business	50% of HH	100% of business	50% of HH	100% of business	50% of HH	100% of business
% of respondents think now	33%	50	100	100	70%	80	67%	73	60%	60	55%	30
% of respondents think within a year	55%	70			90%	90	93%	93	90%	73	73%	70
% of respondents think within two years		80			100					90	82	
% of respondents think within three years	100%	100									100%	100

Demand on the basis of the historical telephone data of NT

Based on the historical data, the demand of telephones for a particular year has been taken as the sum of the telephone connections and waiting list for that year. These figures have been presented in the last column of Table 16 for each location.

Demand estimated from survey estimates and historical data of NT

In summary, the demand figures which are estimated from discussion and on analysis of economic status of locations are given as a percentage of the total households of that location. Table 16 presents this estimate for the year 2005 and also provides demand of telephones worked out from NT's data applying the growth rate calculated for 2005 for comparison. ***However, the demand figure projected by the study based on all this information is the one which is expressed as percentage of households of that location given in column 6 of the table.***

The demand study of these locations does give some idea as to how the national demand will be, but it cannot be extrapolated with reasonable confidence limits.

TABLE 16: DEMAND OF TELEPHONES BASED ON DISCUSSION GROUPS AND NEPAL TELECOM DATA

S.N.	Name of the location	Population 2005			Expected demand		Demand as of NT data		
		Number of households	Population	Population growth factor	Demand as % of household	Telephones needed by 2005 as estimated	Telephone demand 2004 from NT's data	Telephone growth rate (NT)	Telephones needed by 2005 from NT's historical data
1	**Mahendra Nagar**	*15253*	*89755*	*1.03*	**50**	*7627*	5551	8	**5995**
2	Chandani	3215	18286	1.02	**25**	804			
3	Dodhara	3182	20141	1.02	**25**	796			
4	**Tribhuwan Nagar**	10444	50354	1.04	**55**	5744	4507	15	**5183**
5	Narayanpur	2288	14077	1.02	**30**	686			
6	Chailahi (Lamahi)	2974	17330	1.02	**35**	1041	900	19	**1071**
7	**Ilam**	4349	17624	1.02	**60**	2610	2225	15	**2559**
8	Barbote	1266	6366	1.02	**35**	443			
9	Fikkal	2310	10919	1.02	**40**	924	1036	28	**1326**
10	Municipal average	30047	157733		**53**	15980			
11	Rural market centre average	15235	87118		**31**	4694			

6.4.2 Demand for other services – mobile telephones, computers and Internet

Mobile telephone and computer use

In order to gauge demand for new technologies, selected members of discussion groups were also asked questions regarding mobile phones and computer demand. Purposely questions for demand for Internet were left out because it would have been difficult to gather enough information due to its low use. The question for mobile telephones was: *When would 10% of households and 25% of the business take up mobile phones?* The majority think that this is likely to happen within a year.

For computers the question was: *When would 10% of households and 20% of businesses need computers?* With the exception of Ilam, 60–87% think that it will happen within one year. In the case of Ilam, less than 50% of both the groups think that it will happen within a year, for both mobile telephones and computers.

TABLE 17: MOBILE PHONE AND COMPUTER DEMAND EXPRESSED BY RESPONDENTS

Demand expressed by the respondents				% think now	% think within a year
Mahendra Nagar	Professional	MOBILE	25% HH	40	67
			50% Business	40	50
		Computer	10% HH	60	80
			20% Business	30	80
	Youth	MOBILE	25% HH	83	
			50% Business	90	
		Computer	10% HH	73	
			20% Business	100	
Tribhuwan Nagar	Professional	MOBILE	25% HH	60	80
			50% Business	60	80
		Computer	10% HH	50	80
			20% Business	50	80
	Youth	MOBILE	25% HH	53	60
			50% Business	60	67
		Computer	10% HH	73	87
			20% Business	73	87
Ilam	Professional	MOBILE	25% HH	33	57
			50% Business	33	67
		Computer	10% HH	47	90
			20% Business	33	47
	Youth	MOBILE	25% HH	10	50
			50% Business	27	64
		Computer	10% HH	36	55
			20% Business	36	45

Internet and email

Internet and email use is just catching on. Table 18 shows how NT's Internet connections are increasing in various locations since local dial-up rates were introduced by NT in the districts and rural areas. In fact the increase is mainly due to outlying districts now having dial-up access at local rate. The increase of about 2,600 customers (by 70%) over 14 months is mainly the contribution of customers from districts where email and Internet service was either not available at all or not available at local rates. This shows that growth in Internet email services can be greatly enhanced by regulatory and promotional means. The attention of government and the regulator is drawn to this fact. The number of cybercafés that can be witnessed in the municipality shows that these are becoming popular among the youngsters. However, actual growth prediction in rural areas and districts is a difficult task.

TABLE 18: INCREASE IN EMAIL AND INTERNET CUSTOMERS OF NT

S.N.	POP	No. of Customers (August 2004)	No. of Customers (October 6, 2005)
1	Kathmandu	2271	3257
	Banepa		128
2	Bharatpur	64	137
3	Pokhara	203	332
4	Biratnagar	446	553
	Bhadrapur		284
5	Bhairahawa	92	357
6	Dharan	151	166
7	Hetauda	150	344
	Janakpur		150
8	Nepalgunj	349	655
	ISDN		8
	Total	3728	6371
		(Up to Bhadra)	

6.5 Required service levels and transmission capacities to national backbones

6.5.1 Telecom network structure

The telecommunications backbone and power grid more or less follow the East–West highway and several North–South main roads. Basically Nepal's main telecommunication network until very recently was dependent on microwave radio systems. The capacity of backbones varies from 34+34 mbps capacity systems to SDH (2+1) radio system. Lower capacity links to main backbones are planned to be replaced or enhanced in capacity by adding SDH radio links. Fibre optic backbone cable was laid last year from the eastern border of Nepal to Lamahi in the midwestern development region along the highway. This link is expected to be extended up to the western border of Nepal soon.

The OPGW (Over Power Ground Wire) fibre link of Nepal Electricity Authority (NEA) connects Kathmandu and Pokhara to Butwal and Hetauda, forming a ring of fibre optic backbone. The north–south secondary backbones connect hilly districts to the main regional centres in the lowlands through which the main backbones pass.

The district centres and rural market centres are being served by telephone exchanges located in those centres if demand is sizable; otherwise the small locations are served by MARTS, VSAT and VHF telephones. The districts are connected directly to backbones or secondary backbones which connect series of districts. Other rural centres are generally connected to the district centre via radio links.

Nepal Telecom has an alternative wireless technology called CDMA to provide telephone services throughout the country. The CDMA system is aimed to provide 1 million subscriber connections, of which 500,000 subscriber connections are to be completed by July 2007. The new system will virtually cover the whole country through three networks with three switching centres located in Kathmandu (Network I), Bhairahawa (Network II) and Biratnagar (Network III) for the central, eastern and western parts of the country respectively. Network II and Network III will have capacity for 150,000 subscribers each, while Network I will have capacity for 200,000 subscribers by July 2007. These networks together are proposed to be extended by 500,000 subscribers in the subsequent three years.

GSM mobile phones serving mainly urban centres have also substantial coverage of rural areas adjacent to towns. Table 19 shows how district centres are generally being connected to backbones or secondary backbones.

6.5.2 Transmission capacities of the municipal centre under study

Table 19 also gives examples of how municipal centres (district centres) are connected to the regional centres with the microwave radio relay system. The table shows the existing capacities and capacities planned to be added soon. These capacities are planned to satisfy the service level required for increased capacities of telephone exchanges in municipal towns as well as that required for new CDMA base stations to serve the rural as well as urban areas.

TABLE 19: NEPAL TELECOM'S TRANSMISSION LINKS FROM MUNICIPALITIES AND RMCS TO THEIR REGIONAL CENTRES

Links from Bhadrapur-Aitabare-Ilam, Fikkal					
Locations	**Locations**	**Capacity**	**Configuration**	**Distance kms**	
Aitabare	Ilam	34 Mb/s	1+0	11.4	Ilam terminal
Aitabare	Ilam	8 + 8	1+1	11.3	Ilam terminal
Bhadrapur	Aitabare	34 + 34	1+1	38.7	**Regional Centre**
Bhadrapur	Aitabare	155.5	1+0	38.7	**Regional Centre**
Aitabare	Fikkal	8	1+0		Fikkal terminal
Links from Nepalgunj-Rajakot-Ghorahi (Tribhuwan Nagar), Narayanpur, Sineghas (Backbone repeater to Lamahi)					
Nepalgunj	Rajakot	34 Mb/s	1+1	55.4	**Regional Centre**
Rajakot	Ghorahi	34 Mb/s	1+1	30.1	Ghorahi terminal
Nepalgunj	Rajakot	140	1+1	55.2	**Regional Centre**
Nepalgunj	Rajakot	155.5	2+1	55.4	Planned
Rajakot	Narayanpur	8	1+0		Narayanpur terminal
Sineghas	**Lamahi**	**8**	**1+0**		Lamahi terminal
Links from. Dhangadhi-Buretola-Mahendra Nagar					
Buretola	Mahendra Nagar	34 + 34	1+1	42.3	Mahendra Nagar terminal
Dhangadhi	Buretola	34 + 34	1+1	24.8	**Regional Centre**
Buretola	Mahendra Nagar	155.5	1+1	38.7	Planned
Dhangadhi	Buretola	155.5	2+1	24.8	Planned

6.6 Demand modelling

6.6.1 Introduction

The demand modelling activity had following three components:

1. Assembly of available relevant statistics at the District level from various sources, including:
   - Census 2001 and other already published official statistics.
   - Specially commissioned tables produced for this study by experts of the Central Bureau of Statistics (CBS), drawing on the raw data of the second National Living Standards Survey 2002–03 (NLSS2).
   - Data produced by the SECEN/APT study in 35 districts of demand for ICTs, with particular reference to Multipurpose Community Telecentres (MCTs).

   More detail is provided in the NLSS and APT surveys.

2. Analysis of available data, attempting to understand any underlying patterns of demand that they might contain, through a specially commissioned regression analysis of NLSS2 household survey data carried out by experts of CBS.

3. The team's own analysis of the same NLSS2 data integration and presentation of the previous two components, together with our knowledge of demand modelling elsewhere, leading to this report.

The assembled data are available as a project deliverable in the form of an Excel spreadsheet. The two data analyses have provided complementary insights into the structure of the data. They were always of an exploratory nature, and like other explorations lead to many new questions which cannot be answered within the constraints of this project. We hope that future researchers will be able to look further into these questions.

Only the end summary of the demand modelling work is presented here. In order to appreciate the logic behind this analysis, it is recommended that the full report already submitted should be studied. It is notable that the results are consistent with the findings of the demand fieldwork already presented. The approach used should permit demand estimates to be made with a reasonable level of confidence for any part of the country for which data on household incomes (or total expenditure) are available.

6.6.2 Demand estimate summary[7]

Table 20 summarises the total demand figures derived from the NLSS survey, and estimates what the current fixed line demand might be if there were no supply restrictions – that is, if home phones were available to whoever wanted them, and everyone lived within 30 minutes of a phone booth. The estimates assume that people of each income level will spend the same amount on phone service if it is available as other people of the same income level to whom service is available are already spending. Note that these figures apply to the situation in Nepal now (or rather at the time of the NLSS survey, 2003–04). They are not a forecast.

[7] Grossing up to national level assumes a round number of 4.5m households

Because of the small number of survey participants with mobile phones, the survey gives no basis for estimating demand for mobile phones. If and when mobile phones become widely available in Nepal, we would expect them (as in other low income countries) to some extent to substitute for fixed lines. However they also have a strong additional appeal, and will undoubtedly expand the total market size significantly.

TABLE 20: CURRENT AND POTENTIAL HOUSEHOLD DEMAND FOR FIXED PHONE SERVICE

	Survey findings	Estimated position with unrestricted supply	Estimated total household spending now	Estimated total household demand with unrestricted supply (million NR)
Percentage of households having home facilities	10%	30%		
Average regular comms spending per household with home facilities	10,465 NR/year	8,000[8] NR/year	4,709 million NR/year	11,300 million NR/year
Average infrequent comms spending per household with home facilities	770 NR/year	500	346 million NR/year	675 million NR/year
Households without home facilities	90%	70%		
Average infrequent comms spending per household	186 NR/year	250 NR/year	753 million NR/year	787 million NR/year
Total			5,808 million NR/year	12,762 NR/year

[8] Reduction from current average spend assumed to account for existing takeup by households with highest demand

7 Phase II – Design of bidding process and RTDF manual

7.1 Introduction

The basic task consists of the following:

a To develop the details of institutional requirements identified in the strategy report in relation with the following required tasks:

- Assist in the development of regulatory structure of the RTDF, its organisation and procedures for its functioning applicable for telecom network and services.
- Develop the organisational structure and staffing requirements of the new autonomous institution called ICT Facility Development Fund (IFDF) required for the whole spectrum of ICT projects other than telecom infrastructure in rural and peri-urban areas of Nepal.

b To develop fund operational manuals applicable to both the Funds.

c To design the bidding documents necessary for implementation of pilot projects' components outlined in the pilot project document, including development of MoUs with other agencies, government and non-government, as foreseen in the strategy report, which would enable the pilot project to implement ICT projects with community involvement.

7.2 Institutional requirement for RTDF and IFDF

The Telecom Act stipulates that Nepal Telecom Authority (NTA) is entirely responsible for creating and disbursing the Rural Telecom Development Fund for building rural telecom infrastructure where commercial operation is not possible. 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 (support) and NTA pass on the responsibility of managing other rural ICT facilities during the main period of its life, say beyond year 2007, to some other autonomous agency (which is called IFDF in the discussions to follow). Our reasons are:

- The task of assessing and fulfilling rural ICT demand other than rural infrastructure is varied, large, and requiring community mobilisation. It is thus an onerous task, 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 in 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 and 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:

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

A new governing board (now called IFDF) 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.

Two funds – RTDF and IFDF – and two organisations

Therefore, we have come up with two funds, namely: RTDF and IFDF. During the development of strategy, it was identified that RTDF should be managed as it is being done presently within NTA. However, it was recognised that proper structuring of legal and organisation aspect of RTDF is necessary. These have been appropriately addressed in the report.

7.3 Rural Telecommunication Development Fund and the fund manual

In this subsection only the purpose of the manual, the organisation of the RTDF Management Committee and its organisation and administration of the fund and support principles will be briefly described. The details are presented in the Report on Bidding Process Design and the RTDF manual.

7.3.1 Present status of RTDF in NTA

NTA, in its first exercise of rural telecommunications infrastructure development in the eastern development region, has used an IDA credit. NTA, so far, has not utilised the RTDF generated from the operators and the detailed rules and procedures for application of RTDF are yet to be formulated by NTA. A manual for using RTDF has been developed, which describes the legal structure of the managing body of RTDF along with the procedures and functions. A salient point of the content of the RTDF manual (Annex-1 in the Design of Bidding Process) which is presented separately as part of the deliverable of the task under this report is given below.

7.3.2 Purpose of the manual

The RTDF is a fund for supporting telecom infrastructure in those areas in which telecom service provision on a commercial basis is not available. In addition, part of the RTDF funds may be used for universal access (public access points) services. **Universal access** means public access points focusing on communications services like public phone and public Internet access and including basic computer terminals with printer, scanner and video camera, when needed, for transmission and reception of voice/audio, text, images, etc. The fund also supports development and operation of such services in rural areas.

The manual is designed for the purpose of managing RTDF. It defines the scope of support, recipients of the support, and methods for defining the amount and the disbursement of the support. The RTDF support is restricted to the purposes defined in the Act, i.e. telecommunications in rural areas, and does not cover other ICTs or ICT based services. In this manual, an organisation structure of the RTDF has been designed as described below.

7.3.3 Organisation structure of RTDF

The functional organisation structure of the RTDF with relevant functions is shown in Figure 6. However, initially the Fund Manager would require no more than one officer assisting full time and one or two support staff. Thereafter, the staff required for managing various functions will depend on the activities it undertakes and the extent of work that is done through consultants.

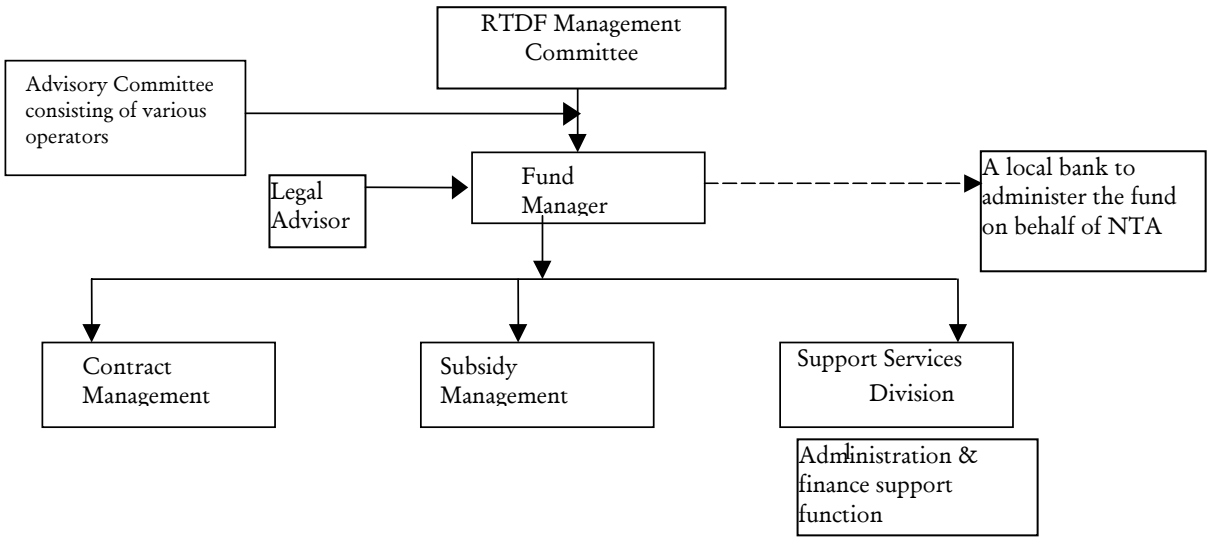

FIGURE 6 OVERALL ORGANISATION OF RTDF

7.3.4 RTDF Management Committee (RTDFMC)

The RTDF Management Committee is composed as shown in Table 21.

TABLE 21: COMPOSITION OF RTDFMC

i.	***Chairperson – Chairman of Nepal Telecom Authority***	**1 seat**
ii.	*Member with background in rural telecom (NTA)*	1 seat
iii.	*Member with background in rural development (External)*	1 seat
iv.	*Member with a background in Consumer Society/Association (External)*	1 seat
v.	*Member Fund Manager (NTA)*	1 seat
	Total Members of the RTDF Management Committee	**5 Members**

Members shall be appointed based on their personal capacity and expertise. Members shall act solely for the purpose of RTDF and not represent any external party such as the institutions from which they are appointed. The RTDFMC shall appoint one of the officers in the RTDF as a secretary to the Management Committee with no voting rights.

7.3.5 Description of RTDF organisation

- The RTDF is proposed to be a semi-autonomous body under NTA. It will be run by a management committee consisting of 5 members including the Chairman of NTA as chairperson. At least two members of the committee will be external to NTA.
- Procedures of appointment, dismissal and remuneration of RTDFMC members, the power and duties of RTDFMC, meetings and decisions are described in the manual.
- The Chairman of the RTDFMC has the right to disapprove individual decisions of the RTDFMC based on the ultimate NTA responsibility.
- An Advisory Committee to meet twice a year is established with the objective of enabling the main stakeholders, in particular private and other operators, involved in use of RTDF, to meet and share information and ideas and to advise the management committee on how best to improve service delivery and the credibility of RTDF.
- A Fund Manager is to be appointed to run the operations of RTDF.
- The RTDFMC is to appoint the professional staff.
- The fund manager has the right to appoint support staff.
- RTDFMC may decide on use of external consultants as required.

7.3.6 Administration of funds and budgeting and plans

- The funds of the RTDF shall be administered separately from the NTA funds. Day-to-day administration of the RTDF funds shall be outsourced to a suitable bank (the RTDF Bank), with international banking rights. The bank shall be selected based on competitive tendering for a period of 3 years. The RTDF Bank will take care of financial management of the fund based on an agreement as a result of the tendering process.
- The RTDF shall prepare an annual report within the same time frame as the NTA annual report. The RTDF funds shall be audited together with NTA funds, and the financial statement shall be approved in the same manner as the NTA financial statement.
- The manual describes what the annual work plan should include. It also should include salient points of the three year rolling plan.

7.3.7 Support principles

Various support principles have been described:

- The main support initially is suggested for telecom infrastructure to be based on one time investment support using maximum coverage for fixed support.
- In parallel to the major support forms, support is to be based on competitive tendering.
- The RTDFMC shall develop other forms of support for minor projects that can be implemented with efficient administrative work.
- One possibility is standard subsidies for activities of the same type.

7.3.8 Rural ICT Facility Development Fund (IFDF)

The IFDF is structured based on the discussion presented in Section 7.2 on the need for two institutions. IFDF is structured in similar way as RTDF. IFDF is proposed as an autonomous governing body constituted as the IFDF Board to manage the other ICTs. Here we will present only the basic IFDF organisation. The draft IFDF manual is also included in the report on Design of Bidding Process.

Organisation

The overall organisation of IFDF is given in Figure 7 below. Once the IFDF starts functioning, other committees and bodies needed for cooperation and coordination with other agencies will be formed as required as part of the normal management process.

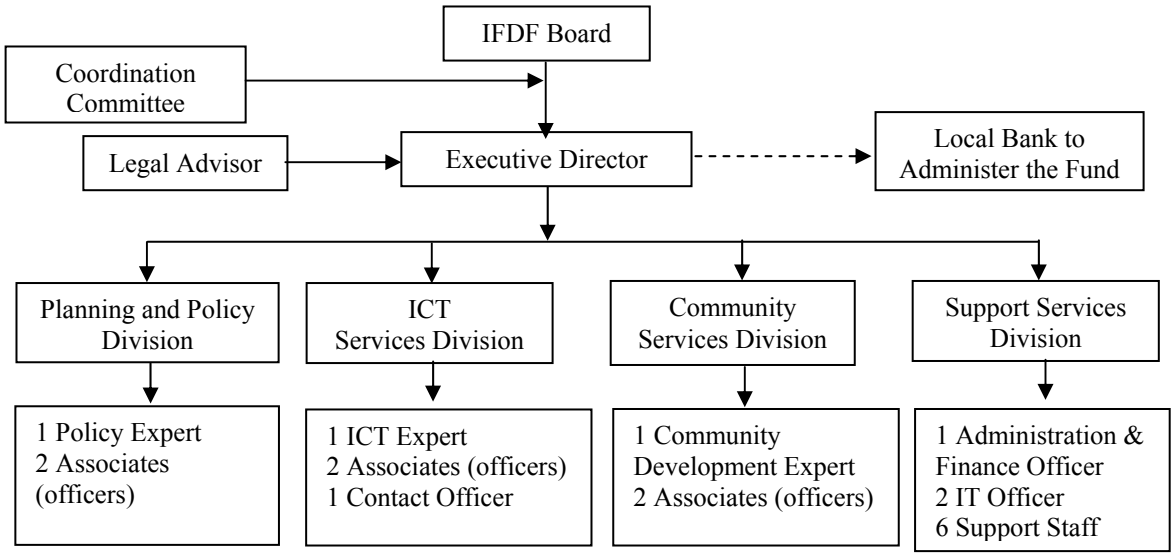

FIGURE 7 OVERALL ORGANISATION OF IFDF

Composition of the Board

The composition of the Board is as shown in Table 22.

TABLE 22: COMPOSITION OF THE IFDF BOARD

i.	*Chairperson from MOIC or MOST*	1 seat
ii.	*Member, from MOIC or MOST*	1 seat
iii.	*Member, background rural community development*	1 seat
iv.	*Member, background DDC/ADDCN*	1 seat
v.	*Member, Executive Director – IFDF*	1 seat
	Total Members of the IFDF Board	**5 Members**

Members shall be appointed on the basis of their personal capacity and expertise. Members shall act solely for the purpose of IFDF and not represent any external party such as the institutions from which they are appointed. Only one person each from MOIC and MOST will be in the Board.

The Board shall nominate one officer from the IFDF as secretary to the Board without voting rights.

Appointment, dismissal and remuneration of Board members

A member who is absent from two consecutive meetings without a valid reason shall be dismissed, and a replacement member shall be appointed for the remainder of the period.

Board members shall be remunerated for meetings in which they have participated fully. The Board shall decide on the remuneration in line with remuneration comparable to the private sector and INGOs.

Powers and duties of the Board

The Board has the power to decide on tendering and selection of support receivers, and to decide on other support forms, in line with the relevant policies and policy directives.

The Board has the duty to:

- manage tendering processes
- manage other support forms
- take into account the requirements of tied funds and related cooperation with donors
- create standard procedures for tendering and support forms
- encourage local institutions and entrepreneurs to participate in the construction, maintenance and utilisation of ICT services within the scope of IFDF
- commission research topics and other initiatives to support usage and utilisation of ICTs in Nepal, and propose such research topics and initiatives to other relevant institutions.

7.3.9 Coordination Committee

IFDF shall form a Coordination Committee for policy development. The purpose of the Coordination Committee is as follows:

- Assist IFDF in development of overall policies on information and communication for rural areas.
- Assist IFDF in developing policies and strategies for development of specific sector in ICTs.
- Coordinate various stakeholders in gathering data and identifying issues.
- Share information on running and upcoming programmes with various stakeholders.
- Share information on the current socio-economic and political situation in the country and advise IFDF on how best to work within such a socio-economic and political environment.

The members of the Coordination Committee will be appointed from various stakeholders: NGOs, INGOs, consultants, various operators, contractors working in the sector, users and interest groups, as well as from relevant bodies of government. An IFDF representative will chair the meetings. Other persons can be invited to the meetings of Coordination Committee, including the press.

Executive Director of IFDF

The Board shall appoint the Executive Director. The Executive Director shall be remunerated at the level of the private sector and INGOs.

Fixed term staff

The Board shall appoint professional fixed term staff. The Executive Director shall appoint supporting staff and temporary staff. Fixed term staff shall be remunerated at the level of the private sector and INGOs.

External consultants and outsourcing

The Board may decide on use of external consultants as required. External consultant contracts exceeding NRs 100,000 shall be based on competitive public tendering. Contracts on lower amounts may be granted directly.

7.4 Description of bidding documents for the pilot project

In this section, very briefly, the salient points of these documents required for the implementation of the pilot project are given.

7.4.1 MoUs

There are three types of MoUs as described earlier; each is described briefly below.

MoU between NTA and Rural Urban Partnership Programme (RUPP)

RUPP is an HMG(MLD)/UNDP project. The partnership of NTA with RUPP in the implementation of cybercafés in DHQs and telecentres in the RMCs was identified as of great value to the pilot project in previous reports. The MoU *(*Annex-3 in the *Design of Bidding Process)* defines the responsibility of each party as follows:

- **RUPP's responsibility**
  - Preliminary work of social mobilisation of communities
  - Creation of user committees
  - Installation of equipment
  - Supervision and monitoring of the telecentres for two years, which could thereafter be passed on to municipalities
  - Liaison between user committee and pilot project (NTA) for activities related to the pilot project
  - Selection of trainees for telecentre operation with user committees
  - Provision of training in telecentre operation and info-mobilisation
  - Selection of cybercafé entrepreneurs in DHQ in cooperation with Tole/Lane organisation
  - Help entrepreneurs obtain loans from community fund if necessary.

- **Pilot project's (NTA) responsibility**
  - Provide fund for purchase of equipment required for telecentres to respective communities (user committees)
  - Provide training expenses for all training required to operator-cum-manager and personnel of telecentres and cybercafés
  - Obtain monitoring and supervision information through RUPP to oversee that the project is meeting intended objectives and provide any help that may be necessary.

Tripartite MoU among NTA, International NGOs and National NGO

The pilot project takes advantage of the use of refurbished (used) computers to cover a large number of schools with a nominal amount of expenditure. As the size of the project is substantial, the pilot project is to be run in cooperation with experienced NGOs. The initial provision of computers is proposed in schools where schools are willing to contribute towards other expenses of the project. The project will be implemented in schools where electricity is available. This particular MoU *(*Annex-4 in the *Design of Bidding Process)* is required for implementation of the Computers and Internet for Schools Project. The responsibility of each party is given below:

- **International NGO's responsibility**

It is possible that two International NGOs may be involved in providing free computers.

  - To collect Pentium III and above level of used computers free of charge.
  - To charge a nominal fee for management of refurbishing, packing and shipping, which will be paid in advance by the pilot project.
  - To ship equipment for use in schools as per objectives of the project and agreed time schedule.

- **National NGO's responsibility**

A National NGO, selected by the pilot project, will manage the entire project; its responsibility will be the following:

  - To inform higher secondary schools of the project district about the project and responsibility of the schools in terms of their contribution in the project as well as their commitment to meeting the project objectives.
  - To collect applications from interested higher secondary schools from the project districts with recommendation of the District Education Office.
  - To establish relations with local NGOs or private entrepreneurs for implementation of the project in line with the purpose of the project being to develop local capability to implement ICT projects.
  - To liaise with the International NGO for scheduling shipment.
  - To manage the shipment, equipment storage and transport to the sites.
  - To complement the equipment with local purchase to build a network, proper provision of power supplies, etc.
  - To manage installation of equipment.

- To manage training of teachers as intended in the project.
- To establish a channel for reporting after the project is completed.
- To obtain certified documents from the schools after successful commissioning of equipment and completion of training of teachers.
- To obtain monitoring information from the schools about use and application of equipment annually for two years following the installation.
- To provide quarterly progress reports of the project to NTA.
- To provide annual monitoring and supervision information to NTA.
- To ensure that all operations of the project are transparent.

- **Responsibility of the pilot project (NTA)**
  - Refurbishing, packing and shipping cost of the used computers is to be provided by the pilot project (NTA), prior to shipping of equipment, to the International NGO.
  - NTA will provide the cost of Internet connection for one year to each school under the pilot project.
  - NTA will monitor through the National NGO that the project is being managed transparently.

MoU between NTA and nPIX (ISPAN)

This MoU (Annex-5 in the *Design of Bidding Process*) will contain the following salient points:

- **Responsibility of nPIX (ISPAN)**
  - nPIX (ISPAN) will use bidding documents acceptable to NTA and the World Bank (these could be NCB documents to be used in the application for IDA credit for the purchase of the equipment).
  - nPIX (ISPAN) will procure the installation services, in a transparent manner, for installing equipment.
  - nPIX (ISPAN) will also procure training services, in a transparent manner, for training of small ISPs to build up their knowledge in peering.
  - NTA will submit monthly progress reports to NTA after signing of the MoU.
  - nPIX (ISPAN) will provide copies of commissioning certificates and completion reports of all the facilities, training and other services procured for the completion of the project.

- **Responsibility of NTA**
  - NTA will disburse payments in amounts due as per contract between nPIX (ISPAN) and the suppliers for equipment and services on the basis of a request letter from nPIX (ISPAN).
  - NTA will monitor progress of the project on a monthly basis.

7.4.2 Bidding document for procurement of telecentre equipment

Documents required depend on the method of implementation adopted by the pilot project.

- The **NCB document** as used for procurement of goods within the country using the proceeds of IDA credit is to be used. In this method, bids will be invited from the supplier within the country; however, any eligible bidder willing to bid from outside the country can also participate. This document has been obtained from the MOIC used in the TSRP project. It has been modified with appropriate data for application in the pilot project as necessary ('*Changes required in NCB Document'* is included as Annex-9 in the *Design of Bidding Process*).

- **Procurement by the user committees**

  - User committees will be provided with specification (minimum requirement of the equipment) of the equipment by the pilot project; refer to Annex-6 in the *Design of Bidding Process*.
  - User committees themselves will buy the equipment on the basis of quotations.
  - The pilot project will disburse the amount as demanded by the user committees.
  - The amount provided will be controlled by the estimate prepared by the pilot project.

7.4.3 Bidding documents for the procurement of the training services

For training services simple quotation can be invited from local suppliers. Therefore, only specification for the training services has been included.

- **Specification of the telecentre operator-cum-manager's training (Annex-7)**

  At the time of preparation of pilot project design, the cost estimate of the training was prepared on the basis that the telecentre manager-cum-operators will have some basic knowledge of how to use a computer. Therefore, the training is designed on the basis of this entry level assumption. After the training the operator will be able to function as manager-cum-operator of a telecentre and will also be able to carry out first line maintenance of the computer and peripherals. It contains training on the following:

  - Telecentre management and operations
  - Infomobilisation
  - Basic hardware maintenance
  - Basic software installation, preparation of backups
  - Email and Internet application
  - Peripherals and their use.

- **Specification of the training for cybercafé personnel**

This training has common elements with telecentre operator-cum-managers' training with one additional unit. The common components are listed below:

- Basic hardware maintenance
- Basic software installation, preparation of backups
- Email and Internet application
- Peripherals and their use.

The additional component will be:

- Hands-on practice on hardware/software maintenance and diagnosis.

7.4.4 Selection of National NGO to manage Computers and Internet for Schools Project

The Request for Proposal Document (RFPD) for selecting an appropriate National NGO, which is included as Annex-8 in the *Design of Bidding Process*, contains the following salient points:

- Summary of the project
- Criteria on which NGO will be assessed
- Responsibility of the selected NGO
- Information sought from NGO to adjudge its capability and determine its qualification.

An NGO can be assessed based on the following criteria**:**

Basic qualification

- Legally incorporated according to the prevailing laws of Nepal
- Managerial capacity to implement the project
- Experience in social mobilisation and promoting people's participation in development activities
- Past experience in handling administrative requirements related with the project
- Past experience in working with national and international organisations.

Additional qualification

The following experience will be advantageous:

- Affiliation with other NGOs and entrepreneurs involved in the promotion of educational standards in rural schools particularly related to computer and IT education
- Previous working relation with an International NGO that provides free computers
- Technical staff – software and hardware
- Experience in bringing computer and Internet education to rural schools in Nepal.

7.4.5 Training (consensus building and transfer of skills)

In this connection three workshops were held:

- An Expert Group workshop was held, to which were invited a number of experts in the country working in ICT and information service delivery organisations, including representatives from MOIC. Strategies for increasing access to rural and peri-urban areas of Nepal were developed and discussed.
- A first in-country workshop was held to finalise the strategies and the summary of findings.
- A final workshop of stakeholders was held towards the end of the project to present the findings and outputs of the assignment.

Throughout the assignment, presentations on each deliverable and some new ideas on strategies and principles adopted in studies were made to the working group and discussed before finalising the reports.

8 Phase III – Support to HMG in conducting the pilot project

The ICT projects to be implemented generally belonged to the group which come under community ownership, with community mobilisation being a vital element. All the projects were designed in such a way that NTA has at least one partner helping in its implementation. This was done to ease the burden on NTA staff of implementing projects with which they are not familiar. So during the design of the project, a great deal of effort was put into identifying competent, experienced partners who are motivated by the common objectives of the project and discussing with them as to how they could participate. The MoUs developed between NTA and partners will help in implementing all these projects, thus not only soon eliminating the need for consultant help but also giving sufficient time to the NTA staff to begin to understand the nature of these community owned projects and learn to manage them for the future.

In addition, the consultants are willing to assist NTA in pilot project implementation for one month beyond contract period as long as NTA is ready to receive such assistance.

9 Final Workshop

A Half day final workshop with the following objectives was organised on 5th of January. It was well attended by participants.

9.1 The objective of the Workshop

The objectives of the workshop were following:

- To present the findings and out come of the study
- To outline the contents of the draft final report
- To present the activities of the partners of pilot project
- To obtain comments and suggestion of the stakeholders that could be incorporated in the final report

The consultants made presentations on almost the entire project. Proposed pilot project partners like RUPP, COPPADES (likely partner), and nPIX also made presentations. The detailed report on workshop proceedings has been separately submitted. The following are the conclusions and recommendation of the final workshop

9.2 Conclusions and recommendations

- The workshop was able to inform the stake holders about the entire study and its findings and outcome.
- On the questions of sustainability of ICT projects like telecentres raised by some participants, Consultants reminded the participants that sustainability was the basis of the strategy proposed in the study. Basing on the sustainability consideration, the number of telecentres proposed in the study is far less than what was proposed in the tenth plan. *It is recommended that while implementing ICTs, full consideration on strategies outlined in the report be considered by authorities so that sustainability issues are addressed adequately.*
- HLCIT seems to still have question regarding having one more agency like IFDF and its role in the face of several agencies (as expressed by them) already involved in managing ICTs in the government. HLCIT thought that they were not consulted while working in such an important area. *It is recommended that while finalising the establishment of proposed IFDF, MOIC, MOSTE and HLCIT work closely.*
- There was strong opinion about need of awareness building for ICTs in rural area. The study has stated that provision of ICTs in rural areas in community should be demand driven. The situation of demand driven can only be reached by building awareness of the people for ICTs, which is one of principles on which rural ICT development is proposed in the study. *It is recommended that awareness building by using Infomobilisation techniques and other means should be followed to create real need for ICTs in rural areas.*
- *It is further recommended that gender aspects must be fully taken care of at the local level.*

10 Recommendations

In this section we would like to summarise recommendations which are based on our findings from the sector overview, workshops, discussion and interviews with people engaged in development of ICTs and other rural development activities. The latter includes the Alternate Energy Promotion Centre and the experience of consultants working in different areas.

10.1 Policy and regulatory Items

- Either HMG should amend the Telecom Act 1997 or NTA should change the current regulation in order to implement the main part of the new telecom policy immediately so as to liberalise the telecom sector.
- HMG should delegate the responsibility of management of frequency to NTA (for the licensee of NTA).
- HMG should nominate NTA as the authority to coordinate the import function of the wireless equipment (for NTA's licensees) directly with the custom authority.
- MOIC should make WiFi Bands in 2.4 and 5 MHz license free to facilitate rapid growth in wireless networks. These frequencies are license free in most countries.
- NTA should waive the licence fee and royalty for providing Internet service in the less developed regions of the country by delineating such areas.
- HMG should decrease the royalty for Internet service providers and community radios.
- NTA should issue directives to telecom service providers to make dial-up Internet access available within a region at local rate.
- NTA should commence regulation of leased circuit prices and quality, as a single operator, i.e. the incumbent operator is the main provider of leased circuits.
- MOIC should make radio broadcasting licensing more transparent.

10.2 Rural telecom infrastructure for telephones

- HMG and NTA should promote provision of optical fibres over the power grid and their lease to operators or users without any license fee and royalty for such backbone providers.
- NTA must encourage Nepal Telecom to attain radio coverage of 95 per cent of the population of the country through its CDMA network, which will minimise the requirement for creating further coverage with subsidy. NT has this responsibility as it has enjoyed a monopoly in the lucrative international telephone service for a long time and its obligation to develop rural communication sufficiently still remains to be fulfilled.
- NTA should start working closely with NT in providing CDMA network for the rural coverage and determine the gap that is required to be covered by RTDF.
- NTA should start implementing trial projects through licenses for telecom network and services using Internet Protocol.
- NTA should commence providing PCO with subsidy for settlements greater than 500, if within a year no commercial operation starts after radio coverage by CDMA.

10.3 Internet access

- NTA must see that public Internet dial-up access is made available to all districts of the country at local rate, without any discrimination between them, to promote growth and use of the Internet.
- NTA must implement local dial-up for Internet within a region to provide choice of ISPs to customers.
- NTA must assist nPIX (ISPAN) in setting up regional Internet exchanges.
- NTA with DDC and municipalities should commence identifying rural market centres for staged provision of public Internet access (2–6 per district).
- HMG should provide computers to secondary schools or higher, for students to learn to use them, wherever there is electricity supply and local competence and interest in promoting the use of Internet and information services.
- HMG should devise and implement further programmes for computers and Internet to schools.

10.4 Community radio stations

- HMG should support establishment of community radios, at approximately 5 per year, to cover 90% of the rural population.

10.5 New governing body for ICT implementation

- NTA should establish the proposed RTDF Management Committee for managing activities under RTDF for telecom facility development in rural areas where commercial telecom services are not possible.
- HMG should establish a proper governing body for managing implementation of ICTs along the lines of AEPC or PAF other than telecom facilities in rural areas under the proposed ICT Facility Development Fund.
- MOIC, MOSTE and HLCIT should work closely while finalising the establishment of proposed IFDF.

10.6 Central level actions for development of ICTs

- Hasten the adoption of ICTs in central government, for example encouraging email communications between civil servants, and also with ordinary citizens.
- Commence producing useful attractive and accessible development content (in local language and minimising literacy requirement).
- Provide good data connections among Nepalese universities, linking them to external academic and research networks (for example, through the Asia-Pacific Advanced Network9 group).

[9] See http://www.apan.net

- Increase awareness of ICTs; include topics related to ICTs in capacity building programmes for DDCs, VDCs and municipal officials.
- Include ICTs in participatory development programmes of DDCs, VDCs, and municipalities to increase access to ICTs in rural areas.
- Implement E-governance to help citizens (both rural and urban).

Annex-1: Terms of Reference

HIS MAJESTY'S GOVERNMENT OF NEPAL (HMG)
Ministry of Information and Communications (MOIC)
Telecommunications Sector Reform Project (TSRP)
Terms of Reference (TOR)
For
Proposed Study on Increasing ICT Access in Rural and Peri-urban Areas of Nepal

A. Outline of Government Policy and Objectives

His Majesty's Government of Nepal (HMG) is already implementing its reform program for the telecommunications sector. Having recognized, the importance of telecommunications as an increasingly important factor for economic development, social inclusion and welfare enhancement of the nation; HMG has taken a number of important actions to improve sector performance. These include:

1. Parliament passed new Telecommunications Act in April 1997 (amended in January, 2001) establishing a modern framework for regulation of the sector. The regulatory framework is aimed at putting all operators on an equal competitive footing and increasing competition;

2. Establishment of Nepal Telecommunications Authority (NTA) as stipulated in the Act and appointment of the NTA Chairman and it's Members;

3. Adoption of the new progressive telecommunications policy in September 1999 (amended in August 2002). The stated policy objective is the liberalization of the sector by promoting private sector participation in all market segments to ensure provision of qualitative telecommunications services at competitive rates. Recently, a new Telecom Policy is approved by the HMG. With the successful implementation of the policy, the sector performance is expected to improve dramatically by allowing open competition. Following are the main features of the new Policy:-

   - Telecom Sector will be completely open by 2004 as envisioned by Telecom Policy -1999
   - An open license system in telecom sector to create healthy competition in the field ending the government licensing regime. A license will be awarded in a transparent manner
   - Technology neutral licensing regime
   - Private sector will be encouraged to invest in the sector. Up to 80 % foreign investment will be allowed.
   - License fees will be charged to cover only the administrative expense and overhead of the regulating agency.
   - Focus on Universal service obligation for the Service Provider in urban area and universal access in rural area
   - Initiative towards the Information Society by expansion of Telecom Service & provision of Cyber Law.
   - NTC will be commercialized by converting it in to a company and reduction of HMG/N ownership
   - Following provisions are provided to promote rural telecom services:

- Use of Rural Telecom Development Fund
- Reduction of custom tariff from existing 5 % to 1% for import of equipment
- Concession of license fees, annual tariff for small service providers for annual income of less than Rs. 2 million
- Promotion of ICT use in support of rural development and Poverty Alleviation

4. More liberal and progressive "New Long-term Communications Policy-2059" has already come into effect since June 2002.

5. HMG-N has issued licenses to the private sector to operate FM radio, cable, and terrestrial as well as satellite TV broadcasting services.

The Ministry of Information and Communications (MOIC) is charged with formulating His Majesty's Government (HMG) of Nepal's telecommunications sector policy. The 1999 National Telecommunications Policy aims to develop and expand telecommunications services in a fair competitive atmosphere with the involvement of private sector and to make available new telecommunications services needed for the development of the country, by fulfilling the demand for services in a timely manner in all the areas of the Kingdom. Specifically, the policy provides for the:

1. Involvement of the private sector in the development and operation of telecommunications services in accordance with liberalization policy of HMG of Nepal.

2. Provision of quality services at a reasonable price by creating an environment of fair competition among the service providers.

3. Provision of basic telephone services in remote and inaccessible rural areas also of the Kingdom.

4. Creation of a pro-competitive interconnection regime.

Progress has been made in the implementation of the policy as evidenced by the following key actions taken by the Government and NTA:

- Issuance of a total of over 110 licenses for VSAT, radio paging and internet service providers; Basic telephone services and cellular mobile service;
- Selection process of a second GSM operator started in November 2000;
- Decision to privatize Nepal Telecommunications Corporation (NTC) and completion of a draft information memorandum (with the assistance of DANIDA financed consultants). The privatization process is expected to be completed within the next two years. As a precursor to privatization, NTC has already been converted to a Limited Company which will be effective from April 13, 2004.
- Selection of a WLL operator in June 2001.

Rural access and connectivity are the priorities of HMG. As a part of strategy of HMG, reflected in the recent telecommunications policy, MOIC and NTA are establishing a benchmark subsidy for rural investments by private operators. Process to issue a license to a private operator for the provision of Rural Telecommunications Services (RTS) in the Eastern Development Region has already been started. The bidder proposing the best option indicating lowest subsidy has been selected through international competitive bidding. This will ensure efficient utilization of scarce public resources and will provide a benchmark for rural operations of NTC.

The primary activities included in the reform program are the following:

- Preparation of a policy update and strengthening the organizational and institutional capacity of the policy cell to enable it to respond to policy issues in the sector
- Modernization of the radio spectrum management and monitoring system and regulatory regime, including strengthening institutional capacity
- Establish an adequate regulatory environment by strengthening the capacity of government to respond to regulatory issues in the sector.
- Prepare licensing strategy to provide telecommunication services in the rural areas
- Finance the subsidy element required to induce private operators to provide rural telecommunication services (RTS)
- Avoid unfair competition among the service providers.

Programs and Institutions Related to Rural ICT Public Centres

There are many stakeholders who are initiating work in rural ICT Public centres. They are Ministry of Science & Technology, MOST (UNDP assisted), National IT Coordination Committee (NITC), Rural-Urban Public Partnership Programme, and Ministry for Local Development (MOLD) and proposed JICA Assistance in Mutli-Purpose Community Tele centre (MCT). UNDP is undertaking (started from May 1, 2003) a study "Assessing the Feasibility of ICT as a Development Instrument for Rural-Urban Linkages in Nepal". The MOLD is preparing an IT Master Plan for Local Governance. The interest of the MOLD in ICT is to promote ICT in District Development Committee (DDC) and municipalities and to host the web pages of these institutions. Further, JICA is interested to provide JPY 100 Million as a grant aid to HMG/N for establishment of MCT model in eight Village Development Committees (VDCs) in four districts in the vicinity of Kathmandu. The main objective of this proposed Japanese project is establishment of 10 MCTs.

Public ICT Access Centres in Rural Areas

HMG/N has an ambitious plan to set up 1500 IT access centres by the end of the 10th plan period. the MOIC and MOST are collaborating through the national IT coordination committee and other working level committees to develop a strategy to implement the plan. The UNDP is providing MOST with limited support to pilot fifteen rural telemeters in order to (i) design, test and specify a replicable methodology for eliciting and delivering the information needs of rural communities. MOIC intends to commission a study to develop a toolkit for scaling out the provision of rural public ICT centres. This would include (i) estimating potential demand, likely take up, user revenue, and ICT potential; (ii) developing funding principles and processes for such centres; (iii) developing business plans for the provision of services; and (iv) developing a monitoring and evaluation process. This proposed study would complement the work being carried out under UNDP funding.

B. Scope of Work for the Proposed Study on Increasing ICT Access in Rural and Peri-Urban Areas of Nepal

Objective

a) To develop of an understanding of the characteristics of the rural/peri-urban and low income ICT market so as to be able to determine the appropriate methods of meeting this demand, including the appropriate institutional arrangements.

b) To determine the cost of providing ICT access to rural/peri-urban and low income users (groups) and what proportion of the cost should be borne by these users and what proportion should be subsidized by the Rural Telecom Development Fund (RTDF).

c) To determine the cost of expanding (and to encourage the private ISP's to expand their services in the rural areas too) internet points of presence in all districts in Nepal;

d) To recommend the institutional and regulatory requirements for the operation of the RTDF.

e) To set out the mechanism as to how private sector can participate in the delivery of ICT services for rural and low income users and the regulatory requirements to monitor such service providers and recommend a detailed strategy to improve access to ICTs in rural/peri-urban and other under-served areas.

f) To develop appropriate business models for the sustainable delivery of ICT access to rural/ peri- urban and low income users through public-private partnerships;

g) To design and support HMG in conducting a pilot project for public access to ICTs.

Overall structure of the assignment

The assignment will be divided into three (3) phases:

- **Phase I**: The consultant will analyze the existing level of provision of these services, what potential demand exists for them, and what constraints exist to their development (technical, economic, and regulatory). The consultant will propose viable alternatives to meet this demand, with a detailed analysis of the costs involved as well as the regulatory implications, and the role of the RTDF. Based on this analysis, the consultant will develop practical strategic options and operational schemes for the provision of the necessary infrastructure and services, such as Internet Points of Presence, telecentres, and Internet access for schools.

- **Phase II**: The consultant shall conduct a demand study and develop a detailed pilot project to be funded by the RTDF (managed by NTA) to demonstrate the viability of the proposed strategy. The consultant shall prepare the bidding documents for the pilot project (for Internet POPs and Telecentres), which can be considered as an experimental bidding round from the RTDF.

- **Phase III**: Support the HMG in conducting the competitive bidding process under the pilot project designed in phase II, and negotiations with the winning bidders.

Task I – Phase One

a) Sector Overview and Review of International Experience. During this initial task the consultant will briefly describe the overall rural environment, existing level of service provided in rural/peri-urban areas, the role of industry players and government institutions, the business and regulatory environment in which these services are delivered, as well as consumer expectations. Information for describing the existing telecommunications and IT sector is expected to be available from existing sources, without conducting primary research, except for short field visits (not to exceed about 12 days) to selected locations identified in conjunction with MOIC, NTA and MOST. Specifically, the review will consider:

- Overall rural environment, including population density and distribution, income levels and distribution, nature of economic activities and principal sources of income, degree of cultural and linguistic homogeneity, terrain, availability of basic infrastructure, in particular electricity and postal services, as well as major potential users of ICT services, such as local governments, post offices, health centres, schools, and large business customers;

- Present and expected future evolution of the legal, policy and regulatory framework within the ICT sector, with particular focus on its impact on the development of rural telecommunications, broadcasting and the Internet;

- Current sector structure, range and reach of services provided, marketing and investment strategies of sector players, and potential existence of alternative service providers (e.g. power companies);
- Current status of the telecommunications network, from the perspective of the suitability of both the national "backbone" and access networks for provision of telephony and Internet services to currently under-served areas, both rural and urban. This would involve a technical survey of the network to identify potential bottlenecks to the provision of advanced services to rural and peri-urban communities;
- Government's objectives and policies for the development of rural areas, including the status of other planned rural development initiatives such as posts, electrification, roads, and water;
- The consultant will advise the Government on recent experience in rural telecommunications and ICT sector in other countries, with particular emphasis on experience which may be relevant in the Nepalese context.

b) Recommended Strategy and Operational Parameters. 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 Telecentres and Internet for schools, to rural and under-served urban areas. The general objective is that service provision in rural and under-served 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 RTDF. Each option will address:

- its impact on meeting service targets over time
- its impact on the evolution of the sector structure
- commercial viability and sustainability.
- compliance with existing policy, regulatory, legal, and technical framework, or with specific suggestions for achievable adjustments to the framework.
- regulatory implications, in particular on licensing, interconnection and tariffs
- private participation.
- extent of local community participation
- overall cost and possible sources of financing.
- relationship between local service providers and long distance carrier or carriers.
- technical capacity to implement the option.

The options are not required to be developed in extensive detail, but rather to that level which will allow the government to identify preferred options for further elaboration and implementation. Preferred funding sources will be the private sector, but public funding sources may also include government, donors, RTDF or new financing mechanisms. If any of these sources are suggested, a brief description of the policies and operations of the funding source shall be included. The consultant shall explore options to structure any such intervention in the most appropriate way so as to leverage the maximum amount of private investment and optimize impact in providing rural service.

c) Recommendation and consensus building. The Consultants shall organize a workshop to discuss the proposed strategies with stakeholders and secure consensus on the preferred strategy. After the workshop, the consultants will finalize the strategy in consultation with the Government, taking into account stakeholders' response. The strategy will include a detailed action program for its implementation together with an estimate of the resources required.

Task II – Phase Two

a) Design of the Pilot Project. The government wishes to conduct a pilot project as a first step in implementing the recommendations of the consultants. The consultants will support in the evaluation of the appropriate "zoning" of the country, evaluate the objective level of service in each region with a cost/benefit approach (according to the penetration goals established), and prioritize the projects, selecting the most promising areas to be served under the pilot project, bearing in mind the available budget.

The consultant will specifically analyze the possibility of expanding Internet Points of Presence in Nepal, installing a small number of commercially viable telecentres in select locations to be expanded subsequently on a commercial basis into a national network of telecentres and public Internet access points.

At the end of this task, the consultant is expected to prepare a methodology, terms of reference, sample survey and select a number of locations, in agreement with MOIC and NTA. These selected locations will represent samples of the target areas for the pilot project, in which a demand study will be, conducted subsequently, which the consultants may conduct directly or may contract out to a local company.

b) **Demand Study:** The demand study will be based on a thorough survey of selected locations, as described below, which will produce a detailed description of expectations for services in the rural and under served urban areas, the potential demand for new services, and technical, legal and business constraints for the delivery of additional services. The potential level of telecommunication and information services utilization in Nepal should be described in detail based on a demand study including three different scenarios (urban, semi-urban and rural). Each scenario should include at least three surveys of the most populated areas within each scenario, according to the National Census. Utilization estimates will include a prioritization of telecommunication needs, such as:

- Priority customers, such as administrative centres, hospitals, police stations, post offices, Internet service providers, schools, businesses, etc.;
- Appropriate extension and connections to the national backbone network;
- Analysis of the users' payment ability and the types of demanded services;
- Required service levels and transmission capacity for towns and villages in different sizes, segments, and/or at different levels in the administrative hierarchy, based on estimates of demand for different services, from voice to Internet access;
- Appropriate policy targets for the desired service levels, such as minimum acceptable distances (in km or hours of walking) from the nearest public communication point, numbers and sizes of villages/towns for which it is achievable to have at least one payphone and/or one telecentre within a specified number of years, as well as estimated cost of this deployment.

c) Design of Bidding Process for the Pilot Project. The Consultant shall assist in the development of the regulatory structure of the RTDF, its organization and procedures. The consultant will design the bidding process and documents involved, coordinating closely with the consultants retained for the development of the legal and regulatory framework if new legislation is required and new licenses and interconnection agreements need to be developed. The consultants shall develop a Fund Operation Manual, taking special attention to building environmental guidelines into the process and drawing from existing experience and similar documents used in other countries. The consultant will also establish the organizational structure of the Fund, covering staffing and assess the facilities and equipment needed.

Task III – Training

Task 3. Consensus building and Transfer of skills

a) Conduct an in-country workshop to present the findings and outputs of the assignment, as an essential step in securing the necessary consensus to ease approval of the policies developed with all stakeholders in the sector.

b) Throughout the assignment, the consultants will provide hands on training to MOIC staff in ICT an effort to transfer skills to their counterparts.

Task IV – Phase Three

Implementation of the Pilot Project. The consultant will assist NTA in conducting the competitive bidding process designed above. The Consultant must support NTA in the evaluation of the offers and preparation of the recommendations to award the licenses and the subsidy (if required). The Consultant will assist NTA in the negotiations of the license and the process of providing the subsidy.

C. Administrative Arrangements

Counterpart

The Consultants shall report to the Project Coordinator, TSRP/MOIC. The assigned counterpart will:

- facilitate coordination with other consultants and relevant Government departments.
- facilitate access to reports, information, and data and to other persons in HMG as appropriate and in a timely manner.
- provide office space, local administrative support and facilities.

The consultants will work closely with the working group in HMGN comprising of officials from MOIC, NTA, MOST and MOLD. While developing the RTDF operational manual, the consultants will work closely with NTA.

Time Frame

The entire assignment is scheduled to be completed in 10 man-months over a period of 12 months.

Phases One and Two of this consultancy are scheduled to be completed within 8 man months in an 8 months period from the date of signing the agreement between the MOIC and the Consultant

Phase Three of this consultancy is scheduled to be completed within 2 man months in a 4 months from the date when the notice is published announcing the beginning of the bidding process for the pilot project

D. Qualifications

Competency and Expertise

The Consultant is expected to provide all the expertise to complete the assignment. The Consultant is expected to have had previous practical experience in carrying out rural telecommunications and ICT studies and must be familiar with the developments relating to the private provision of telecommunications services to rural and low income users. The team is expected to include telecommunications engineer, information technology experts, legal expertise in telecommunication law, telecommunication and ICT economists, financial and accounting expert and institutional specialists.

The Specific Skills Requirements

- Practical experience and knowledge of telecommunications and information technology as well as legal, regulatory and economic and technical knowledge.
- Practical experience in carrying out studies in the delivery of telecommunication and ICT services by private operators to rural and low income users in a developing country environment.
- Previous practical experience in establishing subsidy fund for financing rural utility services.

The Consultant is encouraged to include local professionals or firms as part of the consulting team in carrying out this assignment. The contract will be with the Lead Consultant where a consortium is to provide the services.

E. Deliverables

The consultant should produce the following reports and recommendations with the following timing of the deliverables. The Consultant shall submit monthly reports on the progress of the assignment, and a full report upon completion

Timing	Deliverable
Commencement Date + 1 week	Inception Report, 6 copies (updating the methodology)
Commencement Date + 4 weeks	Report on Sector Overview and Review of International Experience, 6 copies
Commencement Date + 3 months	Final Strategy Report and a separate note on the workshop
Commencement Date + 5 months	Report on the Design of the Pilot Project, 6 copies
Commencement Date + 6 months	Report on the Demand Study, 6 copies
Commencement Date + 8 months	Report on the Bidding Process, including draft bidding documents and regulations for the Pilot Project , 6 copies
Commencement Date + 11months	Draft Final Report for the assignment , 6 copies
Commencement Date + 12months	Final Report for the assignment , 10 copies
Monthly	Progress Report 5 copies

1. **Phase Three** of this consultancy is scheduled to be completed within 4 months from the date when the notice is published announcing the beginning of the bidding process for the pilot project. At the end of this process, the consultants are expected to prepare a report on the competitive bidding process, and in addition giving a full retrospective of the whole assignment.
2. The Consultant will provide hard copies and an electronic copy of each deliverable to the Government (MOIC and NTA). One copy of each deliverable will be provided to the World Bank in hard copy and electronic format. Successive versions of reports, draft regulations and tender documents will be submitted electronically and marked to show changes from the previous draft. The required numbers of final tender documents will be submitted in hard copies.

The final drafts shall be the result of a continuous dialogue with MOIC and NTA, and all sector stakeholders in general (including the World Bank). In this process, and at the request of the MOIC, the Consultant shall draft consultation papers on specific universal access matters as deemed appropriate.

Annex-2: Members of the ICT Working Group and Consultants

The contract for this study was signed on 13th September 2004 between the Ministry of Information and Communications and the Consulting group led by the Organisation Development Centre (ODC). The consulting group consisted of the following:

1. Mr. Mohan Das Manandhar	Organisation Development Centre (ODC)
2. Mr. Manaswee Raj Vaidya	Organisation Development Centre (ODC)
3. Mr. Suresh Kumar Regmi	Professional Computer System (P) Ltd (PCS)
4. Ms. Claire Barbara Milne, Co-team Leader	Antelope Consulting
5. Mr. Arno Wirzenius	Teleplanning A. Wirzenius Ltd.
6. Mr. Satish Krishna Kharel	
7. Mr. Manohar Kumar Bhattarai	
8. Mr. Roger Harris	
9. Mr. Gajendra Singh Bora, Co-team Leader	

The Ministry formed an ICT Working Group consisting of the following officers of the MOIC and NTA to provide guidance to the Consultants in fulfilling the study objectives and also to review the deliverables submitted to the Ministry and recommend their acceptance:

1. Mr. Mukund Prasad Acharya, Joint Secretary, MOIC	Convenor
2. Mr. Sushil Ghimire, Joint Secretary, MOIC	Member
3. Mr. Suresh Kumar Pudasaini, Chairman, NTA	Member
4. Mr. Mahesh Prasad Adhikari, Special Officer, MOIC	Member
5. Mr. Vishwo Nath Dhakal, Under Secretary (Finance), MOIC	Member
6. Mr. Ambar Raj Poudel, Under Secretary (Legal), MOIC	Member
7. Mr. Ramesh Kumar Adhikari, Under Secretary, PPME/TSRP, MOIC	Member
8. Mr. Shyam Bahadur Basnet, Sr. Executive Engineer, MOIC	Member Secretary

During the life of the study there have been changes in the senior positions of the joint secretaries and special officer ranks in the ICT Working Group. The new members in those positions are now:

1. Mr. Suresh Man Shrestha, Joint Secretary, MOIC
2. Mr. Ratna Raj Pandey, Joint Secretary, MOIC
3. Mr. Sohan Bahadur Nyachhuon, Special Officer, MOIC

The Consultants express their sincere appreciation to the Chair and members of the ICT Working group for their valuable suggestions and guidance in the progress and finalisation of the entire study.