

# **“ICT and the Rural Nepal”** *(draft white paper-2069)*

**Mr. Babu Ram Dawadi**  
**Lecturer (Computer Engineering),**  
Institute of Engineering (IOE), Pulchowk Campus  
[baburd]@ioe.edu.np

## **ABSTRACT**

This paper has been formulated as a proposal for the government of Nepal to see possible approach to properly implement Information and Communication Technology (ICT) in rural Nepal.

Based on the liberalization policy adapted by the government of Nepal and after the formation of Nepal Telecommunications Authority under Telecommunications Act 2053[1], it has been observed that there is tremendous improvement in the telecommunications and ICT sectors of Nepal. A bundle of acts, rules, regulations and policies have been issued by the government[2] (like IT-policy, cyber law, electronic transaction act, science and technology policy, telecom acts, telecom policy, telecom regulations....) to address different issues on ICT focusing over rural and urban Nepal. However, the targeted achievements have not yet been met due to several factors in Rural Nepal. We see the rapid change in technologies within last decade making the ICT implementation more efficient and comfortable. To meet the WSIS targets and millennium development goals, it is realized to rapidly penetrate technologies to those low income people of Rural Nepal where the government has just established the new Nepal Fund and we already have sufficient fund under RTDF (Rural Telecommunication Disbursement Fund). Let us achieve the objectives of those funding scheme by deciding to properly deploy ICT in Rural Nepal.

## **KEYWORDS**

ICT, GSM, EDGE, Wi-Fi, WiMAX, Policy, RTDF

### **1. Introduction**

Within the last decade, we realized that there has been a tremendous improvement in IT and the telecommunications sector of Nepal. The global ICT business is increasing day by day with the development of smarter applications, user friendly and rapid deployment of infrastructure.

Nepal, after adopting the liberalization policy to encourage involvement of private sectors in this field, there is optimum competitions in telecom and ISP sectors which help to reduce the digital divide and reach ICT to remote places. With the growing competition in the market constitutes the rigorous increase of ICT indicators. ICT should not only be for elite people/group. For the overall development of the country, it should also be for disabled people, ethnic group, marginalized group, low income people and many more. The ICT is environment friendly only if we succeed to bring ICT to those peoples by addressing different sectors like agriculture, industries, tele-medicine, academia, energy and environment.

### **2. ICT and the Rural Nepal**

Reviewing the last five years ICT indicator's status, the overall ICT penetration of Nepal reached over 75%, which we can see from the

MIS reports of Nepal Telecommunications Authority (NTA), an independent telecom regulator of Nepal.

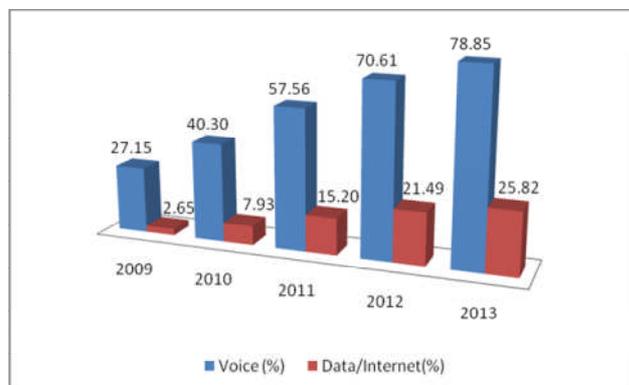


Fig: Voice & Internet Penetration of last five year[1]

The data/internet penetration is not that much satisfactory as mobile penetration however target of having mobile phone on everyone's hand will be achieving soon. Definitely the ICT penetration on urban and peri-urban areas of Nepal is considerably better but almost more than 70% areas of Nepal covered as rural area has not yet been achieved as targeted as per the government policy. With the diverse geographic and demographic condition of Nepal, it is not that much easy to deploy ICT in rural areas. To meet the millennium development goals and the WSIS targets, it is necessary to increase the ICT penetration more into rural Nepal. Nepal Telecom, the government owned company had been subsidized by the fund (RTDF) to extend PSTN land line to every VDC of Nepal. Similarly more than 50 tele-centers have been established across different parts of the country. Dedicated telecom companies have been licensed to run the telecom/ICT services over rural Nepal. To make Nepal Flat by ICT services, and considering diverse geographical condition, wireless media would be the better solution especially for rural Nepal. Some of the ISPs are massively extending their Wi-Fi network throughout the country. GPRS technology lunched by the telecom companies would be another platform to make ICT

accessible to rural people. But this is itself is not sufficient based on the pattern of its accessibility. It is now time to analyze different approaches for suitable ICT penetration technology for Rural Nepal. The basics way how to lunch ICT in rural areas may be:

1. The Wi-Fi network like what Mahabir Pun and other ISPs are extending. But it has sustainability and maintainability issues.
2. Telecom's Data Connectivity services like by using USB Dongle over mobile network to connect individual PCs and devices. It is also not suitable for high-speed network in the common service centers.
3. GPRS: only accessible via mobile phone having its data service enabled.
4. WiMAX service: Nepal Telecom's WiMAX service is the latest deployment making the ICT services easily accessible within the existing infrastructure. Comparatively better approach for enterprise and individual data services.
5. Fiber/UTP connectivity: this connection is feasible only up to district but it is almost impossible to deploy fiber network up to VDC level of Nepal due to its difficult terrain.

### 3. ICT Policy for Rural Nepal

The IT policy first time formulated in 2000 by Nepal Government has identified three critical areas of IT strategies:

- ◆ Universal Access to ICT
- ◆ Education and Training for IT
- ◆ Adaption of IT application.

National Telecentre project was launched as pilot project especially to touch the rural areas of Nepal with the main objective empowering village communities with capacities for “using ICT for communication”, “accessing information resources” and “efficient deployment of ICT services”. The objective might lead to identify some promising areas like:

- ◆ Agricultural Information
- ◆ Distance Learning
- ◆ Telemedicine
- ◆ Environment Projection
- ◆ Natural Disaster Mitigation
- ◆ E-commerce
- ◆ E-government and more.
- ◆ .....

Telecom Policy (2004) has also special addressing regarding ICT accessibility to rural areas. The policy says that “appropriate information and communication technology for the users of rural Nepal” [telecom policy 2004] will be adopted. To fulfill this, smaller to larger service providers are encouraged to provide the suitable technology. With the recommendation from telecommunication authority, the government took decision for dedicated licensee as rural telecom operator(s) and also provide subsidy to boost up its operation. Government incumbent operator has also been subsidized. Low cost licensing (Rupees 100 for ISP license) regime is the main motto of the government to encourage for efficient ICT services in the Rural Nepal.

However due to different circumstances, there is still the policy gap and the implementation gap exists to achieve the targeted goals. Sparse population, educational gap, lack of source for sufficient income generation, travelling difficulty, power issues, geographical situation and technology deployment etc are the

challenging issues for the government and private parties towards ICT enhancement.

#### **4. Rural ICT Centers: Prospects and Problems**

There have been attempts by governmental and non-governmental agencies to increase the penetration rate of ICT in Rural Nepal. Till date, more than 50 tele-centers were established, some form of common service centers were also established as pilot project in public-private partnership over certain rural localities. But how the rural people get benefitted with this Telecentre projects and what are the major issues running these centers? These are to be analyzed. We can see the impact of using ICT in corruption control, democracy and human rights, economic and social welfare, promotion in health and education and reduce digital divide. But with this benefit, we can foresee series of issues to run the ICT centers efficiently like:

1. Cost of technology: like the internet cost, equipment and its delivery with its operation.
2. May be the lack of following:
  - a. Sufficient furniture's and other technical equipments (servers, computers, printers, scanners...)
  - b. Skilled human resource
  - c. Management
  - d. Market with resource users due to lack in education and low income status of the people.

This leads to in overall, sustainability problem. But major problem is the lack of awareness and choice of best technology.

#### **5. Choice of Wireless Technologies**

Considering the geographical situation of Rural Nepal, it is almost impossible for wired network

for backbone connectivity to enhance ICT. Even if, the wireless mobile communication itself is becoming challenging due to difficulty in BTS tower setup, inaccessibility of the areas etc. Hence the ultimate approach is to use wireless broadband connectivity which we can achieve by WiMAX (Worldwide Interoperability for Microwave Access) technology with its better efficiency and easy deployment mechanism. However there exists GSM-GPRS, 3G-EDGE, LTE, the last mile solution seems to be the WiMAX for its wider coverage, and fastest data-rate.

GPRS is a system used to transmit data at speeds of up to 60 Kbits per second and is a battery friendly way to send and receive emails and to browse the internet but in these days of broadband connectivity it will be seen inefficient for individual as well as enterprise data service.

EDGE (Exchanged Data rates for GSM Evolution) is a recent development based on the GPRS system and has been classified as a '3G' standard due to the fact that it can run at up to 473.6 Kbits per second, however this speed itself is not sufficient for individual and enterprise data service.

HSDPA (High Speed Downlink Packet Access) is a technology based on the 3G network which can support speeds of up to 7.2 Mbits per second. In reality you will most likely get a top speed of around 3 Mbits but this is useful for mobile TV streaming and other high end data transmissions. To use HSDPA your phone must be able to support the technology and of course you will need to be located within range of a cell site that has been upgraded to offer the service.

Long Term Evolution or LTE is the first step towards true 4G technologies. To be a truly 4G technology, download speeds of 100 Mb/s and 1Gb/s should be available from moving (i.e. in a

car) or pedestrian points respectively. LTE offers maximum download speeds of 299.6 Mb/s although there have been controversy over the speeds some operators running LTE networks are providing, sometimes being lower than the supposedly 'inferior' HSPA (plus) technology. LTE requires brand new network technology and masts / radios. This also means that the devices that support LTE will also need to have a compatible receiver. Much like the available 3G technologies, connection to an LTE signal will cause an extra strain on your device's battery and it is recommended to manage your connections.

There are technologies (LTE-Advanced, Mobile WiMAX) that are capable of reaching the recommended speeds for 4G. WiMAX is a wireless broadband technology, which supports point to multi-point (PMP) broadband wireless access over of wide coverage. WiMAX is another name for the 802.16 IEEE wireless broadband standards. WiMAX can solve a problem called the "last-mile" problem, by connecting individual homes and business office's communications.

WiMAX has the potential to do to broadband Internet access what cell phones have done to phone access. In the same way that many people have given up their "land lines" in favor of cell phones, WiMAX could replace cable and DSL services, providing universal Internet access just about anywhere you go.

Generally speaking, WiMAX has a range of up to 31 miles and can give users high capacity links on both the uplink and the downlink of up to 75 Mbits per second (Mbps) data-transfer rates on a single channel. It can be used to provide both campus-level network connectivity and a wireless last-mile approach that can bring high-speed networking and Internet service directly to customers. Metropolitan Area Networks (MAN) connections to home and business office, especially in those areas that were not served by cable or DSL or in areas where the local telephone company may need a long time to deploy broadband service, The WiMAX-based wireless solution makes it possible for the service provider to scale-up

scale-down service levels in short times with the client request.

In Nepal, currently WiMAX is made available to public in individual and enterprise level by Nepal Telecom. With its wide advantages, it could be the preferable infrastructure and services for ICT enhancement in Rural Nepal.

## **6. Rural Nepal and the RTDF**

With the provision on Telecommunications Act, 1997 and Telecommunications Policy, 2004, 2% royalty RTDF has been collected by NTA every year from telecom/ISP operators (licensee). The objective of this fund is especially dedicated to Rural Nepal making it technology equipped zone reducing the digital divide and empowering the rural people via ICT. The collected fund crosses 6 billions; however the disbursement plans itself becoming a challenge for the government. Government has recently set the legal provision on the policy that the RTDF can be utilized on optical fiber network expansion and community/school connection. However the district optical fiber project will make Rural Nepal roam next one decade for its development. It is just an infrastructure development, what we say is focusing over infrastructure sharing is the best option rather than setting up new infrastructure. There are several agencies like Nepal Telecom, Nepal Electricity Authority, NCELL and others private parties already expanded fiber/wireless network throughout the country. The basic thing is let us make Rural People feel like they are getting the benefit of RTDF by utilizing it into the last mile areas. Hence government should decide to deploy WiMAX like technology into rural people and community in an affordable price. The major hurdle is the lack of education and awareness to use technology for Rural People. The government should subsidize its incumbent operator (Nepal Telecom) to provide free (or very nominal fee) internet connectivity

to rural people for certain periods like up to periods when making the rural community will be well aware of technologies and smoothly bring the sustainable solution for long term operation. In this approach, the major source of subsidization is the fund (RTDF) collected on NTA which directly benefit Rural People.

## **7. Priceless ICT for Rural Community**

The concept is just trying to formulate here with the objective to:

1. Reduce digital divide
2. Make Nepal Flat by ICT
3. Proper Utilization of RTDF

The government should develop a criterion based on people's income status (capacity to pay) whether to make services cost free or not. However every school or community may be equipped with ICT center where the government can setup internet via WiMAX or other appropriate connectivity approach. Necessary setup cost and the cost of equipment (customer premise equipment, computers, networking equipments) should be donated to the community/schools freely and if for the individual connection, a Customer Premise Equipment (CPE) will be donated to the rural family (or group of family) in a discounted cost (or cost free) based on its capacity to pay. To avoid the misuse of the service, efficient regulation and management approaches have to be adopted so as to fulfill the objectives of the government to enhance ICT in rural Nepal. It has already been envisaged that wired backbone to the rural is too costly and almost impossible. Within the locality of every Village Development Committee (VDC), where if ADSL is connected, can setup local network/inter-network in an affordable prices, however there are most of the places even far from the office premises of the VDC where we can reach only via WiMAX as a best broadband service. We know that rural literacy rate is very

low however increasing the ICT accessibility will definitely help people aware themselves and help improve their daily life through the improvement in their work activities. ICT helps to reduce the literacy GAP, skill GAP, communication GAP among the people of different aged groups and many more.

## 8. WiMAX setup: one time installation Cost

This section provides the tentative idea of total cost estimation for the first time installation of WiMAX service at the community/ICT center. Base on Nepal Telecom's WiMAX tariff plan, the following table is the tentative estimation for one time installation and monthly cost to run an ICT center over the rural areas.

Description	2Mbps Scheme		
	Qty	Rate	Total
Internet/Month	1	9,300	9,300
Router	1	5,000	5,000
16 Ports Switch	1	6,000	6,000
Computers	10	30,000	3,00,000
Cabling and Network points	12	300	3,600
Printers Laser	1	11,000	11,000
Monthly Maintenance Cost with HR		12,000	12,000
Miscellaneous (electricity, paper...)		10,000	10,000
<b>Total</b>			<b>3,56,900</b>

Description	256Kbps Scheme		
	Qty	Rate	Total
Internet/Month	1	1,050	1,050
Router	1	5,000	5,000
16 Ports Switch	1	6,000	6,000

Computers	4	30,000	12,0000
Cabling and Network Points	6	300	1,800
Printers Laser	1	11,000	11,000
Monthly Maintenance Cost with HR		7,000	7,000
Miscellaneous (electricity, paper...)		6,000	6,000
<b>Total</b>			<b>1,57,850</b>

From the tentative calculation in the tables above, the total setup/installation and first month running cost would be about NRS 360,000/- for 2Mbps connected center and NRS 160,000/- for 256 Kbps connected center. Different schemes like 512Kbps, 1Mbps would be provided by the operator as per the requirements. However several other costs (like delivery of items, installation...) would be associated for ICT center setup. The monthly internet usage charge and one time installation cost could be subsidized by the government while the running cost would be sustained by the income of the center itself. Sustainable income could be generated by internet surfing charge, printing and other facilitation for operation, maintenance and Human Resource (HR) management. Except having ICT center, internet connection could be provided on an individual basis. For which all the operational costs would be the responsibility of the individual users. In such case, rural literate peoples would be benefitted with the subsidized internet access charge, if they have computer/laptop or smart phone at home to access the ICT resources.

## 9. CONCLUSION & RECOMMENDATION

The slogan "ICT is everywhere and ICT is for everyone" can only be achieved if.

- a. All the Nepalese Telcos and ISPs are encouraged to expand their infrastructure towards the most rural areas of Nepal. I.e. increase the coverage to whole Nepal.
- b. Provide subsidy to the government incumbent operator or else to expand WiMAX and other relevant ICT services and increase the broadband connection towards rural Nepal.
- c. Due to high broadband prices, people even in the urban areas are not able to access ICT services efficiently. It is realized that based on Nepal's GDP status, the broadband prices are comparatively high. Appropriate study in reference with international market has to be undertaken and reduce the broadband prices.
- d. It has been shown that for a developing countries 10% increase in broadband penetration causes 1.38% growth in GDP. Given that the economic and social benefits of broadband connectivity have become increasingly evident across the developed and the developing world in recent years.
- e. The global target through Millennium Development Goals can be achieved if the Nepal government take appropriate steps through policy and increase ICT/broadband coverage towards whole Nepal.
- f. It is obvious that enhancement of ICT technologies have offered compelling prospects of bridging gaps in service delivery, making government more inclusive and transparent and creating conditions for enhanced economic growth.
- g. Hence, priceless (only for short period of time with the objective to kick start increase of ICT accessibility)

WiMAX/Wi-Fi services to peoples of rural Nepal by utilizing the available RTFD fund to connect schools, communities, healthcare centers and many more would be the first step for the government towards ICT enhancement in Nepal. However possible abuse/misuse of free internet access has to be addressed through policy, rules and regulation and proper monitoring.

## 10. REFERENCES

1. MIS of NTA, [www.nta.gov.np](http://www.nta.gov.np)
2. ICT, Telecom policies of Nepal, [www.moic.gov.np](http://www.moic.gov.np).
3. <http://www.itu.int/en/ITU-D/Statistics/Pages/default.aspx>
4. <http://www.ntc.net.np/WiMAX/wimax.php>
5. [http://de.wikipedia.org/wiki/Mobiles\\_Internet](http://de.wikipedia.org/wiki/Mobiles_Internet)