

# **INDIAN RURAL TELEPHONY : A CHALLENGE**

## **An Abstract**

*Providing access to telecommunications services in rural areas continues to challenge policy makers and telecommunication operators alike. The problem is complex and solutions require an understanding of the technical issues as well as the policy instruments used to create incentives for rural service providers.*

## **Introduction**

1. Today with the telecom revolution, channels of communications are taking different forms. In fact, telecommunications has become such an integral part of our socio-economic fabric that it has changed the way people think, act, react, talk, work, communicate and live. It is difficult to imagine life without telecommunications any more. There is a strong two-way co-relationship between economic development, literacy and general awakening of a region, with its teledensity. Access to telecommunications has a strong and direct positive impact on the overall economic growth, development of the private sector, delivery of public services and integration of the rural and isolated areas with the rest of the country. The poor, specially the rural poor, have less access to telecom services than justified by their poverty levels and the emerging “digital divide” is widening.



Connecting Rural India

It is an established fact that the income of the poor grows faster in telecom intensive economies and access to affordable telecom services is essential for any strategy for poverty reduction. Rural communications help people to participate in market economy and also improve productivity by saving time and transportation cost. It is therefore, important to extend availability and access to affordable telecom services in rural and other vulnerable areas.

### **Demographic and Geographic factors in India**

2. India is a vast and diverse country, almost of the size and variety of a whole continent. There are about 300 cities and 4600 towns, besides four metropolitan towns. There are many languages, cultures, religions, castes, and creed. It is the second most populous country in the world, the largest democracy and has a great variety in demographic and geographic terms. The terrain is varied, with hot deserts, high mountains, long coast lines, plateaus, arid and marshy lands, valleys, forests and fertile lands. It has a population of more than a billion people and geographical area of about 3.3 million sq kms. The average population density is 319 persons per sq. kms, which varies from as thin as 10 persons per sq. km. in States like J&K to as high as 2000 per sq. km. in Delhi, Mumbai and some other areas. Although during the last 5-10 years a rapid urbanization of rural areas has taken place, yet more than 70% of the population lives in 6,07,491 villages. The economy of the country is still predominantly dependent on agriculture although the distribution pattern is gradually changing in favour of industry and service. Due to growth in industrialization, commerce and services the telecommunication demand is growing fast. The difference in teledensity between rural and urban areas at present is more than the differential quotient in their poverty levels. A number of measures have been taken in the recent past to accelerate the telecom growth and one of the immediate concerns is to bridge the emerging digital divide.



Bridging Digital Divide

### **The growth of telecom sector and changes in the policy framework**

3. Initially, these services were mainly used for Government, trade and industry. After independence, the growth of telecommunication in India picked up and the pace

gradually gained momentum. Manufacturing of telecom equipment began in public sector units like ITI, and telecom services were gradually spread in several parts of urban areas, Government offices, trade and industry and some rural areas. With the development of agro-based industries and the need of telecom services in rural areas, there was a sharper focus on the provision of telecom services in rural areas. In early 1980s, a Mini-mission of Rural Development was started and a Special Task Force was set up to open more and more small and medium sized telephone exchanges in the villages. Further, a time bound programme was undertaken to extend at least one public telephone in rural areas within easy reach of villagers. The growth of telecommunication in India received a major spurt in early 1980s with the launch of "Mission Better Communications" by the Government. The main objectives of this Mission were:

- Improvement in Quality of Services and Customer support.
- Improvement of accessibility within the existing network.
- Concentrated attention to the indigenous development and manufacture of certain Technologies and products.
- Target of "Telephone on Demand" was also set up, as to be achieved by the year 2000.
- Participation of the private sector in production and services of telecom sector was permitted.

4. Besides, under the "Mission Better Communications" a special R&D Centre called Centre for Development of Telematics (C-DoT) was established in 1984, with an objective of developing the latest world class indigenous switching equipments of Digital Electronic Exchanges and transmission systems suitable for Indian conditions, particularly for rural areas. The manufacturing of customer premises equipments like telephone instruments, drop-wire etc. started in the private sector in 1984. Several other initiatives were taken, Posts and Telegraphs were segregated, Mahanagar Telephone Nigam Limited (MTNL) and Videsh Sanchar Nigam Limited (VSNL) were set-up as separate corporate entities. A rapid proliferation of STD/PCOs (Public telephone call centers) took place all over the country, both in urban/semi-urban as well as in rural areas and accessibility and so also the demand for the services rapidly increased with availability of facilities nearby. To facilitate the faster growth of telecom services in the country, the Government of India constituted Telecom Commission in 1989. This is the apex policy making body, with full powers of the Government. Telecommunications, which is a central subject in the federal set up, received a major concentrated thrust by this high-powered Body. The process of telecom reforms received a further fillip in 1990s, with the introduction of the New Economic Policy 1991. Value added services were opened to the private sector. Licenses were granted to private operators for providing cellular mobile service in four metros and also for paging services. With the National Telecom Policy 1994 (NTP 94), further thrust was given, specific targets were set for achievement including for rural areas. Several other liberalization measures were effected, including opening up of basic telephony for private sector and establishment of Telecom Regulatory Authority of India (TRAI). However, the most significant landmark

in telecom reforms was New Telecom Policy 1999 (NTP 99), which heralded a series of initiatives, completely opening the telecom sector.

### **New Telecom Policy 1999 (NTP-99)**

5. The most important landmark in the process of telecom reforms was NTP 99 which was made effective from 1st April 1999. This paved the way for change-over from fixed license fee to revenue sharing, migration of existing operators to the new regime - thus resolving their long-standing difficulties, strengthening of Regulator (TRAI), opening of the National Long Distance, corporatisation of telecom services, and establishment of Bharat Sanchar Nigam Limited (BSNL) etc. The policy had also stipulated several specific and time-bound targets in teledensity, rural telephony, etc. The following specific objectives, targets and stipulations for rural areas are enshrined in NTP 99:-

#### **Objectives**

- Availability of affordable and effective communications for the citizens.
- Strive to provide a balance between the provision of universal service to all uncovered areas, including the rural areas, and the provision of high-level services capable of meeting the needs of the country's economy.
- Encourage development of telecommunication facilities in remote, hilly and tribal areas of the country.
- Encourage development of telecom in rural areas making it more affordable by suitable tariff structure and making rural communications mandatory for all fixed service providers.

#### **Targets**

- Increase rural teledensity from the current level of 0.4 to 4 by the year 2010.
- Achieve telecom coverage of all villages in the country and provide reliable media to all exchanges by the year 2002.
- Areas of North East, Jammu & Kashmir and other hilly areas, tribal blocks, etc. to be identified as special thrust areas for accelerated development of telecommunications.

#### **Universal service obligation**

6. Universal Service is desirable for social, economic and political reasons and to enable low-income customers, customers living in rural, remote and high cost areas, the physically disadvantaged and elderly customers to participate in the mainstream and remove the feeling of isolation. The common approach to Universal Service in the developing countries like India is to provide Universal Access, individually to households at affordable charges and to the others by shared access through a suitable provision of subsidy. It is essential in a public policy, to provide availability and access to all people for basic telecom services at affordable and reasonable prices.

7. One of the incentives to the operators to invest in rural areas could be to provide funds through USO Fund. Till so far, the entire development in rural areas has been done by the incumbent operator through cross-subsidization. However, with tariff rebalancing, deregulation and corporatisation of the incumbent operator, the situation has perceptibly changed and warrants a careful look on the arrangements, to meet the rural telecom needs. While the deregulation had, no doubt, expected the private sector to play a significant role in providing the telecom services in the country, the experience so far has been that the private operators have concentrated mainly in the urban areas both in the basic and value added services, despite the clear contractual obligation of the private sector to provide certain percentage of total number of telephones in the rural areas. In a deregulated environment, private operators, generally tend to concentrate in the high income and high-density areas with high incidence of information intensive industries/activities. The provision of telecom facilities in rural areas can bring about significant changes in socio-economic conditions of these regions as also the integration with the rest of the market economy, bringing in considerable direct and indirect benefits to the economy. Some of the advantages are indicated below:-

- (a) Telecommunication facilities enhance the region's appeal as an attractive location for investment.
- (b) Local producers and service sector get enriched through integration of market and provision of regional, national and international links, which can improve better price realization of goods and services
- (c) Diffusion of innovative technologies and information-based services is facilitated.
- (d) The quality and efficiency of the government at the grass root level can improve through e-governance.
- (e) Research and development in leading edge technologies can be stimulated.
- (f) Two major barriers to rural economic growth i.e. the distance from the market place and lack of economies of scale can be broken by telecom facilities, particularly with broadband data communication facility.
- (g) There is considerable latent demand in rural areas, which can surface with right conditions and stimulants.
- (h) Information and communication technology (ICT) centres in rural areas can be effectively used for providing information and delivery of public services on matters related to production, prices, health, education, animal husbandry, weather conditions and service sector.
- (j) Greater employment opportunities and other benefits flowing from essential applications of information technology viz. E-commerce, e-governance, telemedicine, distance learning, software development, e-business operation etc. to the advantage of rural population.

## **Recommendations of TRAI for Rural Telephony**

8. There is large differential between rural (1.94%) and urban tele-density (31.1%) in India. Also the Indian rural market is very different. The cable TV in India has more penetration than telephones. The villagers can have substantial purchasing power if the price of their produce is right. In order to provide momentum to the rural telephony, TRAI recommended :

- No prior SACFA clearance for deployment of towers upto 40 m. in rural areas.
- No spectrum fees for usage of CorDECT and similar technologies in rural areas as well as for usage of 450 MHz.
- No right of way charges for networks in rural areas.

In order to offer financial incentives to service providers in the form of coverage of partial cost of shared infrastructure and license fee and spectrum charge reduction based on the number of rural base station locations, TRAI proposed change from a universal obligation (USO) model to one where incentives are given for rural networks which are as follows:-

- Sharing of infrastructure to receive support from USO.
- Discount in Annual License Fee and Spectrum Charges linked with Rural Coverage.
- Supporting backbone infrastructure through USO fund

## **Administration of USO**

9. It would be necessary to evolve an appropriate institutional mechanism for the administration of USO. There are various activities involved in the administration, for example, collection of information from eligible operators to assess net cost of meeting USO, collection of contributions, disbursement to qualifying USO providers, calling for standardization of formats and procedures for maintenance of accounts by all Service Providers for the sake of uniformity, and total transparency. In brief, the following functions would require to be performed.

- To determine the aggregate USO support on yearly basis from the claims filed by USO providers and compute the percentage of Universal Access Levy (UAL) accordingly. The Universal Access Levy would be deposited in a USO Fund.
- To determine a service provider's eligible revenues for imposing UAL
- To determine the 'eligible service providers' for USO support.
- To make recommendations on the quantum of UAL.
- To evaluate the claims for funding support of Service Providers meeting Universal Service Obligation.

- To carry out technical and financial audit of claims of USO providers, against the most cost-effective network solution (proxy model, if need be) as reference standard for providing VPTs, rural and remote direct exchange lines in different geographic/ demographic situations.
- To settle the claims of eligible service providers and make disbursements from the USO Fund.
- For carrying out the above, prescribe the relevant formats and procedures for maintenance of technical and financial data records by the various service providers.
- To manage the balances of USO fund, arising out of estimates that are higher than actually required. Generally, these are carried forward to the next year to provide relief and lessen the contributions from the service providers to that extent.
- The organisational set-up to administer USO will have to be evolved keeping in view the above activities.

### **Technical Developments in Rural Telecommunications**

10. The oldest telecommunications technology, copper wire, has evolved over the past few decades and has presented new options for rural telephony. When rural systems were first developed, service over long distances was provided with open wire connections, suspended on poles or trees. In some areas to save on copper, single line open wires were used, where the earth served as the return conductor. When the number of users increased, copper pairs were shared (party line). As the infrastructure developed, carrier systems were introduced. Through frequency multiplexing and the use of coaxial cables the calls of many users were transported on the same line. With the introduction of digital technology this system was augmented by the use of time division multiplexing (digital loop carrier). With properly conditioned feeder cables, multiplexing allowed economic extension of the network.

11. **Radio systems:** Although multiplexing enabled network extension it did not resolve the issue of low cost service at large geographical distances. In order to serve distant rural areas, particularly those with very sparse populations, radio systems present the advantages of scalability and easy deployment. However, while radio systems solve the problems of poles and copper wire theft, they require an external source of power, which is not an issue for fixed line service. Solar power may be a solution, although it is not deployable in all locations and may also be subject to theft. Radio systems have also undergone an evolution from analog to digital technology. In rural areas a widely deployed system is the so-called Point-to-multipoint system. Unfortunately standardisation of these systems has been limited and many manufacturers have ceased production.

12. **Cellular mobile networks (Fixed access):** With the arrival of cellular mobile telephone systems new options for rural areas came into view. Already in an early stage it became clear that investments made in mobile networks to serve a different group of users could benefit rural subscribers. At first these systems were deployed using a variety of analogue standards, whereas today digital systems are in use in many

developing countries. Apart from the placement of single telephone booths, another implementation uses mobile network to provide local access through a managed telephone service . This system has proved to be a good solution in areas where cellular coverage is available.

13. **Wireless local loop (WLL):** A third category of radio-based services is wireless local loop. Although standard implementations have not evolved, vendor specific solutions, both analogue and digital, have been used for some time. They continue to suffer however from a relatively high cost per line. An answer to this has emerged in the Indian design and deployment of corDECT, a system based on the original digital cordless system, DECT. The corDECT system provides an extended coverage area of about 10 km for about half the price of a classical WLL system. Furthermore, the corDECT system provides low cost service with some mobility, which the WLL systems did not allow. This feature gives rise to disputes between corDECT operators who can operate without a special mobile license and those mobile operators who have paid a high license fee for this privilege. Another advantage of the corDECT system over other WLL systems is that it can provide data connections for Internet access with speeds up to 70 kbps.

14. **Satellite:** When Global Mobile Personal Communications by Satellite (GMPCS) systems were announced there were high expectations for the use of these systems in rural areas. Consortia offered developing countries free use of access channels. Naturally in return for this use the countries were expected to grant licenses to use frequencies and operate in their countries. Currently, both Iridium and Globalstar, the only two GMPCS firms in operation at the global level, struggle to attain profitability. Consequently, the deployment of these systems for general access in developing country rural areas has been severely limited. One other alternative is Very Small Aperture Terminal (VSAT) systems, which have now been installed in various countries. These systems provide a good solution for isolated areas, particularly where a connection over land would be too costly. In any particular rural application the choice of technology depends very much on the local conditions. Subscriber density, clustering possibilities, distances to nearest national connection point and the characteristics of the terrain have to be considered. Also local technical expertise and adoption capacity have to be taken into account.

### **Maintenance in a rural telecommunication context**

15. Providing a "technological solution" to the rural telecommunications problem is one thing. To provide a "working and sustainable solution" is something else. The breakdown of service takes several months for service to be restored. In these situations it is difficult to persuade people to use a system and even further to pay for that use. The rural environment, in developing countries in particular, puts a lot of stress on equipment. There are not only the harsh climatic conditions, but also failure of power systems and unforeseen human interventions can cause interruptions of operation. In these conditions, the level of reliability should be higher than for ordinary telecom equipment, considering that the higher costs of this reliability will be paid back through a reduction in maintenance costs and higher revenues. An integral component of reliability is a proper maintenance strategy, which has to be adopted from the beginning of the design of a rural network. This includes use of a remote monitoring and

maintenance centre. And also the reservation of sufficient funds for the acquisition of spare parts and logistics for getting these parts at the right time, in the right place, by the right technician.

### **International Practices**

16. The problem of providing telephones in uneconomic areas exists in almost all the countries of the world irrespective of their stage of development. However, in the developing countries, the problem seems to be more acute. Different countries have addressed this problem in different ways. A global scenario of the funding of universal services in various countries depends upon the needs of the area, principles and local content, however, based on the following principles:

- a) **Quality and rates:** Quality services should be available at just, reasonable and affordable rates.
- b) **Access to advanced services:** Access to advanced telecommunications and information services should be provided in all regions of the Nation.
- c) **Access in rural and high cost areas:** Consumers in all regions of the Nation including low-income consumers and those in rural, and high cost areas, should have access to telecommunications and information services, including inter-exchange services and advanced telecommunications and information services, that are reasonably comparable to those service provided in urban areas both in quality and rates.
- d) **Equitable and non-discriminatory contributions:** All providers of telecommunications services should make an equitable and nondiscriminatory contribution to the preservation and advancement of universal service.
- e) **Specific and predictable support mechanisms:** There should be specific, predictable and sufficient Federal and State mechanisms to preserve and advance universal service.
- f) **Access to advanced telecommunications services for schools, health care, and libraries:** Elementary and secondary schools and class rooms, health care providers, and libraries should have access to advanced telecommunication services.
- g) **Additional principles:** Such other principles as are necessary and appropriate for the protection of the public interest, convenience and necessity and are consistent with this Act.

### **Synergising infrastructure to accelerate rural telephony**

17. It may be necessary to synergise the existing infrastructure of various operators to optimize the resources and efforts in accelerating the telecom development in rural areas. For example, apart from DoT and its corporations like BSNL and MTNL, there are other agencies like Railways, Power Grid, State Electricity Boards and other Public Sector Undertakings like SAIL, BHEL, and ONGC etc. who can all contribute to these efforts. It may be worthwhile, for example, for the BSNL to consider entering into

strategic alliances with these organizations so that with minimum additional investment in infrastructure, the reach of rural telecommunication can be enhanced effectively. The spread and coverage can be considerably multiplied by interconnectivity and usage of overall communication network to whomsoever it may belong. In the financing also, there can be some contribution built in from various social sector projects, like in rural development, health, education etc. There can be synergization of delivery of various social services to rural areas like health and education etc. For example, primary health centers can be interconnected with doctors in the civil hospital and tele-medicine project can be launched. Tele-education can be implemented through linking of schools, etc. Altogether, there may be possibilities of a variety of applications based on synergy and costs can be optimized and shared.

## **Conclusion**

18. The telecom network was expanded at a rapid pace after the mid-eighties and an eightfold increase over 1987 was realized in the number of DELs in 2000. Simultaneously, the growth in rural areas was also impressive which displayed eleven-fold increase during this period. This was achieved due to specific policy thrust given through “Mission Better Communications”, NTP-94 and NTP-99. However, the teledensity in rural areas is still abysmally low. The major constraints for the low teledensity have been lack of investible resources, nonavailability of appropriate technology combined with difficult geographical terrain and continental size of the country. In pursuance to the process of reforms, the telecom sector has been liberalized to a great extent and a series of measures have been undertaken and various sectors opened for private competition. The incumbent operator has also been corporatised in October 2000. While these steps would encourage private investment, the social obligation of providing telecom facilities in the rural and un-economic areas has acquired new dimension. In this regard, the telecom operators would need to be provided certain incentives and financial support to ensure the required services in the rural areas. It may be necessary to evolve certain measures to encourage investment in rural areas through a suitable mix of incentives like tax concessions, waiver of license fee and interconnection charges, etc. The challenges are, therefore, much greater in catching up and also fighting the emerging digital divide, considering India’s diversity of regions, incomes and demographic pattern. Optimum solutions have to be evolved with appropriate policy initiatives for funding, technologies, organisational structure and regulation.