

Expanding Broadband Access *in Rural India*

The Role of Alternative Telecommunications Networks

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By Keith A.J. Hay



Over the past five years there has been a veritable explosion of technology and consumerism in India, but this has occurred largely in urban and middle class communities. Rural India still needs to catch up. There are more than 500 million Indians residing in over 600,000 villages scattered throughout rural areas of the country. These areas still appear much as they have ever done—thousands of villages, surrounded by modest farms worked by many landless labourers with low incomes and poor prospects for improvements in living standards. As yet, few of these villages have access to best agricultural practices, large-scale markets, or information about the earnings opportunities that lie beyond their perimeters.

Rural India Lags Behind

Rural India's lagging development can be attributed in part to the fact that some 90 percent of Indian rural villages have inadequate access to telecommunications services. With few exceptions, their telecommunications connection to the outside world amounts to one public telephone, with varying degrees of individual access and reliability. Hardly any villages have access to the Internet or the wealth of knowledge, applications, and opportunities that it could present to them. While Internet dial-up access is theoretically possible in rural India, it is rarely achieved, leaving farm communities unable to discover the range of agricultural advice, supply purchasing, weather and disease information, price discovery, and product sales opportunities that could improve local farm and non-farm incomes.

Moreover, many of these interactive real-time activities require access to high-speed broadband Internet networks, which have been even further out of reach for rural

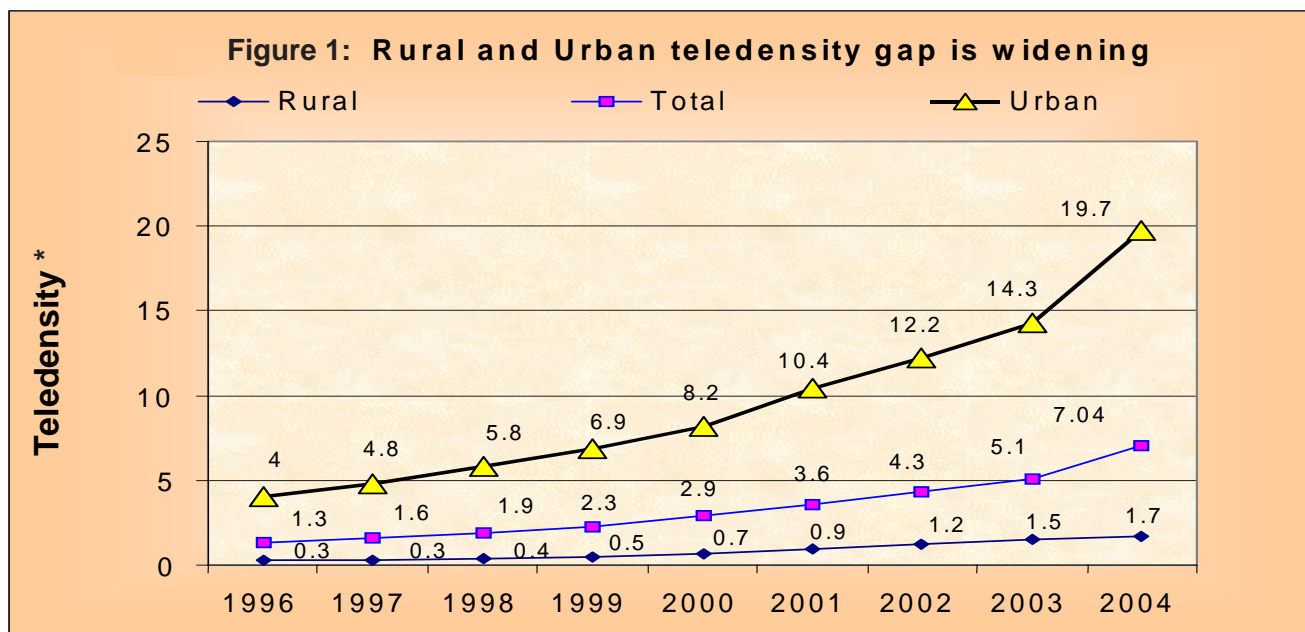
communities. Broadband access would also allow villagers to make use of tele-health, tele-education, tele-entertainment, and a range of government support services (e-services).

Harnessing Communications Technologies for Development

Tapping into broadband is becoming increasingly possible as technology improves, costs fall, and advanced business models begin to make Internet access a worthwhile proposition for small and large-scale producers alike.

There is widespread recognition that access to broadband and Internet services can be a key element in spurring and diversifying the sources of India's economic growth, income gains, and social development. Indian business and political leaders recognize the success that widespread broadband access has brought to Korea and Malaysia, and

The World Bank Group



* # of fixed + mobile phone lines per 100 people

Source: Indian Telecommunication Statistics 2004, DOT & TRAI Telecom Service Performance Indicators June 2004

increasingly now in China. India is already striving to develop telecommunications policies that will hasten a similar process. But given the demographics of India, to achieve major improvements in broadband access at the national level will clearly require strenuous efforts to reach out into rural areas. The widening gap is demonstrated by the data in Figure 1. Connectivity to e-commerce, e-governance, e-learning and e-health requires 'last-mile' installation of broadband capability in both urban and rural areas.

There are some 250 projects to bring Internet services to villagers across India, but only a handful are financially self-sustaining and aimed at extending access to wider areas (see box on Rural Broadband Initiatives). In addition, few of these experiments actually deliver sufficient local bandwidth over the "last mile" to provide real-time interactive opportunities for rural communities. Solutions to the Indian 'last-mile' problem require a variety of policy initiatives. These include: (a) more rapid approval of radio frequency authorizations for certain uses; (b) access to low-cost trunk bandwidth; (c) changes in operator licensing regimes; (d) possible support by the Universal Service Fund for output-driven rural initiatives; and (e) harnessing of new technologies. Such policies must be blended together with effective technical solutions and

local business models to facilitate rapid deployment of sustainable broadband and Internet services at the village level. One such strategy may include taking advantage of pre-existing alternative telecommunications networks.

Is There a Special Rural Development Role for Alternative Telecommunications Networks?

India's Railways (RailTel), Gas Association of India Ltd (GAILTel), and the national electricity distribution network—PowerGrid—have each built their own trunk line telecommunications systems. Each of these entities is a Government of India public service unit (PSU). Principally, these networks are to meet their respective national communications requirements along their own rights-of-way. These Alternative Telecommunications Networks (ATNs) operate their own in-house telecommunications systems which have substantial built-in available capacity.

Using public funding, the ATNs continue to build spatially extensive trunk networks which, by 2008, will see railways with 40,000 kilometers of Optical Fibre Cable (OFC), power distribution with 20,000 kilometers and gas distribution with 17,000 kilometers. These build-outs will involve the instal-

lation of very substantial OFC capacity by each ATN and will make India's ATN-PSUs among the largest trunk telecom operations in the world. The ATN-PSUs act, in part, as "carriers' carriers," so that some proportion of their low-cost transmission capacity is already leased by commercial operators.

A substantial volume of ATN-owned OFC capacity remains underutilised. This available capacity is continuing to be offered as trunk bandwidth leases to third parties at prices heavily discounted from regulated-rates. Yet marketing of this lit and dark fibre trunk capacity is proceeding slowly. A valuable function for much of this available capacity would be as a low-cost backbone for provision of rural broadband service connections as part of the larger set of uses for these publicly funded ATNs.

How the ATNs can be Prime Movers in Providing Trunk Broadband Services

At an early stage in the formation of the Alternative Telecommunications Networks, several alternatives to the PSU-based ownership and structuring model might have been considered. ATNs could have been set up and operated as partly private companies, somewhat separate from their parent "utilities." Another option was for ATNs to enter into partnerships or joint ventures with the private sector, or to assign their operations, management, and marketing mandates to private sector bidders. Any of these options would have engendered enhanced competition in trunk bandwidth markets and promoted greater efficiency gains, economies of scale, and scope. Only now are some of these options receiving active consideration.

While the ATN-PSUs are relatively small in terms of their current revenue generation, their large publicly-funded infrastructure investments in trunk OFC capacity strongly suggests potential for future revenue growth. By harnessing advanced technologies and applications, and at the same time becoming more directly associated with private sector management and marketing expertise, the ATN-PSUs can contribute effectively to development of India's telecommunication networks by providing low-cost, easily accessible, and reliable broadband and Internet services.

Rural Broadband Initiatives

There are many broadband/Internet projects focused on rural areas which have been implemented by various State Governments/NGOs or Corporate Houses. Some of these projects are:

- ITC e-Choupal
- N-Logue
- MS Swaminathan centre in Pondicherry
- Akshaya in Kerala
- Gyandoot in MP with focus on e-Governance
- Bhoomi in Karnataka
- E-seva in Godavari District of AP
- Warana in Maharashtra by NIC
- Aksh Broadband
- Jagriti in Punjab

In these projects, rural areas have established connectivity through technologies such as satellite, microwave link, copper, and fibre depending on what infrastructure is already available or has been specially installed for this purpose. However, recent work by Telecoms Regulatory Authority of India suggests that very few of these projects are self-sustaining, and e-Choupal, which serves 25,000 Indian villages with agricultural e-commerce solutions, may take four years to break even because of the high initial capital costs per village.

These can be made accessible to the majority of India's citizens, both in metropolises and the countryside.

Working With Private and Public Local Service Providers

In parts of rural India—particularly in small towns and large villages—there is a modest mixture of private, public, and NGO local communications service providers. These entities may be providers of small-scale cable TV services, regional ISPs, VSAT and agricultural e-commerce systems, or national telecommunications services. These local operators can cover the "last mile" to some villages, or are at least within technological reach of it.

Each of these business types offers an important opportunity for ATN-PSUs to become the prime movers in extending their rural outreach through a form of partnering. By offering access to their low-cost trunk bandwidth and working with local service providers—which could act as either joint-venture partners and franchisees or potentially under a local form of broadband authorization—they can, at one remove, act as retail service suppliers. In order to do so, ATN-PSUs need to become more actively involved with local and regional service providers.

Traditional copper wire links can provide simple dial-up services. On-going developments in wireless technologies—such as the advent of WiMax—mean that the range of methods to reach out from the widespread ATN OFC networks is rapidly increasing, thereby contributing to the potential for new modalities for cost effective rural ‘last-mile’ services delivery (see box on WiMax). By seeking local partners, exploiting the latest technologies, and using well understood and tested business models, the ATN-PSUs can support the kind of public services to rural communities that will introduce them to the advantages of broadband knowledge streams including access to market information and trade through the Internet.

The Way Forward

In order to optimize the development contribution of the ATN-PSUs, the following policy and regulatory options should be considered:

- 1) Each ATN-PSU should be separated as a stand-alone corporation from its ‘parent’ utility. This would assist in clarifying the capital and operating expenditures and revenues of the ATNs. This initiative would also make it easier to identify cross-subsidies and facilitate regulatory measures in support of a level playing field for all operators.
- 2) The ATNs should be encouraged to consider a variety of business modalities and available technologies to reach the regional and ‘last mile’ service points. Business models may include working with retail SME clients or local service providers such as Cable-modem/

WiMax

By 2007, a new wireless technology that can link villages 30 to 50 kilometers apart could be available for rural India, allowing broadband to be distributed from nodes connected to alternative telecommunications networks (ATNs)—or other carriers—to outlying areas.

Current economically viable radio technologies can reach out only 15 to 20 kilometers from a central terminal with direct ‘Line of Sight’ (LOS) and perhaps half that distance with non-LOS.

operators (CATV), NGOs, or commercial entities. ‘Last mile’ infrastructure may involve the use of existing copper, CATV, and wireless technologies, including in the future WiMAX systems.

- 3) Licensing and regulatory agencies may wish to consider incentive-driven support mechanisms, such as targeted subsidies using the Universal Service Fund to facilitate the installation of ‘last mile’ solutions that are connected to the ATN trunk networks, in order to bring low-cost broadband and Internet services to many more rural areas of India.
- 4) Agencies should assess whether telecommunications licensing and regulatory measures presently discourage business models that have potential to accelerate private investment to meet rural connectivity needs. Thus current requirements for licenses for telecommunications operators should be reviewed to determine whether a form of rural telecom operator license, with much lower fees, should be implemented.
- 5) Similarly, given the rapid development of radio technologies with potential for rural applications, a review should be made of radio licensing policy to promote the use of these new technologies in rural areas.