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ABCD of broadband in India

Introduction - back to basics

Telephony in India has shown remarkable growth, with the number of subscribers increasing from 205 million in Q1 2007 to 865 million by the end of Q4 2012. In contrast there were just 15 million broadband subscribers, with broadband penetration at 1.2% compared with teledensity of 75%.This paper looks at why this might be so and what can be done about it.

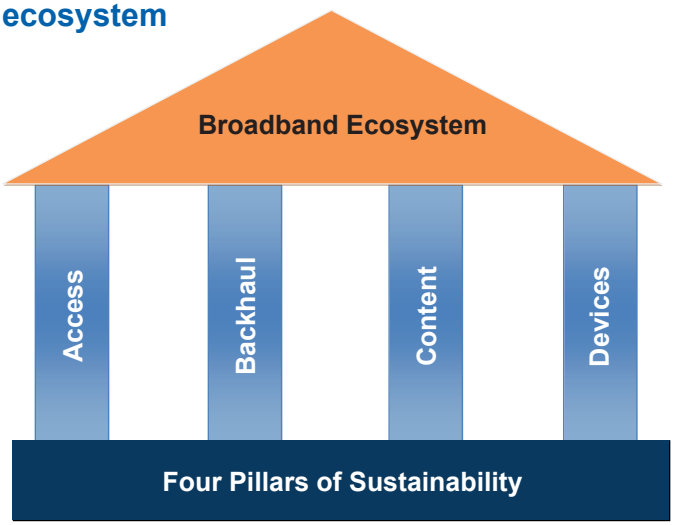
A decade ago, broadband was unknown in India with Internet access being low speed dial up. The Broadband Policy of 2004 set ambitious targets, but was flawed and failed to deliver.

It was not until the end of 2011 that the focus shifted back to broadband, with the government declaring "broadband for all" as a national priority. In the National Telecom Policy 2012, the government set a target of 175 million broadband connections by 2017 and 600 million by 2020, with the provision of broadband access to all village panchayats or councils (250,000) by 2014 and to all villages and habitations (600,000) by 2017.

Presently, over 60% of broadband subscribers live in the top ten metros/tier-I cities and more than 75% of connections are in the top 30 cities. Just 5% of broadband connections are in rural areas, compared with about 35% of total telephone connections in such areas. According to the latest IMRB survey, there are 38 million users, 4.6% of the rural population, who have accessed the Internet at least once in their lives. Although 70% of India's population lives in rural areas, most Internet users are urban.

In order to develop broadband, an ecosystem supported by the four pillars of access, backhaul, content and devices is required (see Figure 1).

Figure 1 - ABCD of the broadband ecosystem



The infrastructure - supply-side issues

The primary cause of low penetration of broadband, especially in rural areas, is the non-availability of backhaul connectivity and lack of access networks for the last-mile, due to the absence of a sustainable business model.

i) Lack of a nationwide backhaul network

In October 2011, the Government of India approved the creation of the National Optical Fibre Network (NOFN) to provide connectivity to all 250,000 village panchayats. The existing core Optical Fibre Cable (OFC) network, used by different service providers, covers state/district/block headquarters, but does not extend to most panchayats. The plan intends to connect all the gram panchayats through optical fibre, with extra fibre being laid by the existing Public Sector Unit (PSU): Bharat Sanchar Nigam Limited (BSNL), RailTel and Power Grid. The estimated cost of USD 4 billion, over 2 years, is to be met from the Universal Service Obligation Fund.

To manage and operate the NOFN and to ensure non-discriminatory access to all service providers, a Special Purpose Vehicle (SPV), Bharat Broadband Network Limited (BBNL), has been incorporated. Tripartite agreements have been signed by the government, BBNL and state governments/union territories for free use of rights of way (RoW).

The backbone network thus created will be available to service providers to provide broadband services in rural areas on an open access basis, at nominal lease charges, just to recover operation and maintenance costs, with the CapEx funded by USOF as a "sunk" cost.

ii) Non-availability of access infrastructure

Another important factor in the slow growth of broadband is the inadequate access infrastructure, both in rural and urban areas. While next generation access (FTTH and LTE) provides a solution for urban areas, innovative business models are required to ensure rural access.

iii) NGA challenges

While the high cost and shortage of spectrum is a challenge for LTE growth, the hurdle for FTTH has been the cumbersome and expensive access to rights of way, as well as regulatory ambiguity for active infrastructure sharing. As both NGA technologies have high CapEx, it is not possible for a single owner to exploit their full potential without infrastructure sharing. Also access infrastructures are considered to be natural monopolies and their duplication by service providers is not economically justified. Policy makers and regulators have to help by removing bottlenecks such as access to rights of way and ambiguities regarding active infrastructure sharing.

iv) Last-mile access as a managed service

There is a need for independent infrastructure providers who have the vision, expertise and CapEx, who are willing to create and share infrastructure in a neutral and open manner to enable high-speed connectivity to customers in a timely, efficient, reliable and cost effective manner. This trend seems to be developing in urban India with a 'special breed' of entrepreneur being created.

v) Exploiting existing last-mile infrastructure

Another way to increase urban broadband penetration is to utilise the existing 32 million copper loops. Currently, about 85% of total broadband connections are being provided using DSL, with cheap customer premises equipment and low overall cost, it should be affordable. The incumbent, BSNL, has an extensive network with 28,000 rural exchanges connected through optical fibre and owns around 22 million copper loops, of which only 9 million have been upgraded to DSL. The balance can provide DSL within a 3-4 km area around exchanges. However, penetration of copper loops is not widespread in rural areas (6 million) and in some cases the poor quality and long length of the loop does not support high-speed DSL.

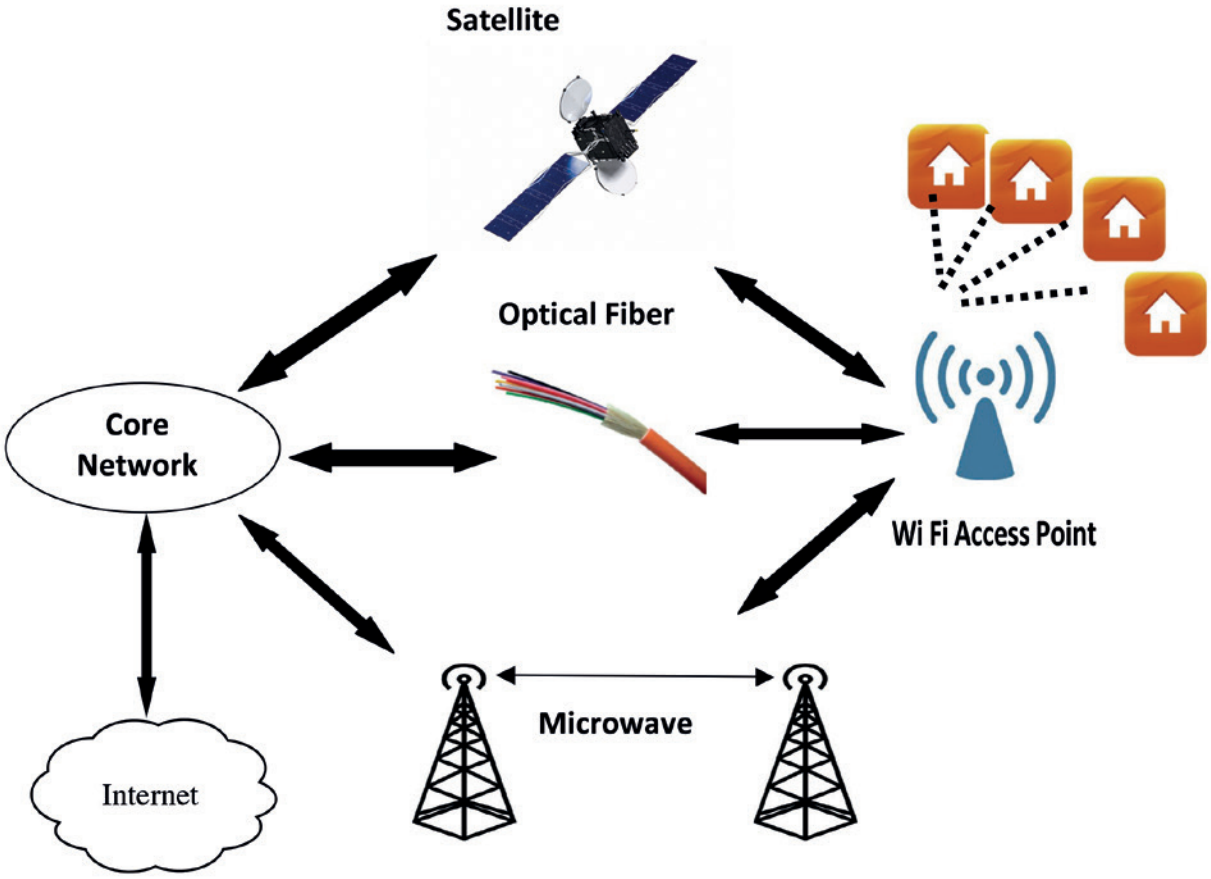
vi) Utilizing cable TV networks - convergence

Cable TV networks in India have access to about 100 million households. Most cable networks are analogue and one way, the data suggesting that only 10% of existing networks are capable of providing broadband access. Moreover, only about 8% of this capacity (i.e., 0.8 million broadband connections) had been reported by December 2012. To provide broadband, these networks would need to be upgraded and digitised.

vii) Rural access infrastructure - wireless

Because of the higher cost of deployment and absence of return on investment (ROI), there seems to be no business case for the creation of traditional or next generation access infrastructure for rural areas. Fortunately innovative technologies, especially using wireless, are being developed. These provide a competitive access solution in areas with no communications infrastructure, or where the existing infrastructure cannot be easily and economically upgraded. In view of ease of deployment and faster rollout, wireless is expected to be a major contributor to the growth of broadband in rural areas.

Figure 2 Multi-technology networks for broadband



viii) Wi-Fi - the licence-exempt spectrum

Wi-Fi technology, which uses unlicensed spectrum, can provide affordable broadband access in rural areas. This option is low-cost and has a wide ecosystem, is easy to install and can be used to provide adequate capacity for supporting broadband services with a mix of legacy and ethernet traffic. Figure 2 depicts such a multi-technology network.

Content and devices - demand side

i) Content and applications

IP-delivered content for education, health and government services makes it possible to overcome geographic and financial barriers that have made it difficult to reach poor and marginalized segments of the population.

In 2006, the Department of Electronics and Information Technology (DEITY) initiated a nationwide plan to deploy 105,000 Community Service Centres (CSCs) using a public private partnership (PPP) model in rural areas under the National e-Governance Plan (NeGP). The scheme envisaged CSCs as the front-end delivery for such services, managed by local village level entrepreneurs (VLEs).

The mass adoption of broadband requires relevant applications. Most web-based content is in English with the English literacy rate in India only around 7%. Consequently, there is a need for content and applications in vernacular languages and the development of suitable software.

ii) Awareness and skilling about broadband

Another reason for low uptake is the lack of awareness of the benefits of, and applications enabled by, broadband. There is a move to address this through awareness campaigns.

iii) Devices

The high cost of broadband access devices is a hindrance to the growth of broadband in rural areas, although prices are declining.

The government under the National Mission for Education through ICT is providing "Aakash" tablets to students at a cost of INR 2,250 (USD 40). It plans to extend the scheme to rural areas and to develop e-content for these tablets.

Need for a business case

As discussed above, one reason for the low availability of broadband in rural and remote areas is the absence of a viable and sustainable business model. Operators are not sure about the ROI or demand. A World Bank study showed the affordability level of a broadband connection is about 3% of per capita income, about INR 100 (USD 2) per month for rural India. Thus, an innovative business case is needed to demonstrate that broadband network infrastructure can be deployed and sustained through the joint efforts of stakeholders in a PPP model.

On the regulatory side, niche "class" licences/ authorisations, without any entry barrier and revenue share obligations for local operators, are needed for small towns. Government needs to support local entrepreneurs and increase their sustainability by allowing "bill-and-keep" revenues from on-net communications and localized content. The local community should be required to contribute through initial seed funding and facilitation.

A possible business model would be franchising by the service providers, using local entrepreneurs to provide broadband services, for example, the VLEs who manage the common service centres and are already computer and Internet literate.

A business plan for rural broadband - Panchayat (Community) Public Private Partnership (4P) model

In the absence of the ROI for the expected CapEx, as well as the restricted potential for revenue due to the constraint of affordability, the success of the rural broadband business will depend upon the government's policy and regulatory environment, with investment support and incentives provided by local bodies for creating the underlying infrastructure.

Also, the involvement of a local entrepreneur or community under a PPPP model with an opportunity to create a business case through government-funded infrastructure is key to the sustainability of broadband in rural areas.

Government and local financial support will be required to create the infrastructure for village level broadband service centres (VLBSCs) and to help get funding from financial institutions to meet business case requirements. The VLBSC will become the franchisee/ agent of an ISP/licensed telecom operator and will install, operate and manage Wi-Fi access infrastructure, working as single point of contact for rural broadband services, billing, customer support, etc. VLBSCs will also use this infrastructure to generate extra revenue by providing content, value added and application services.

The ISP/telecom operator would provide interconnectivity to the VLBSC's access network through the backhaul network. In the absence of an existing backbone, the operator may need to use satellite-based backhaul to the network. Since the operators will link to the rural franchisee at a marginal cost, they should be obliged to provide these services on an incremental cost basis and share the revenue with the franchisee.

Some of the innovative rural broadband network solutions are self-contained, maintenance-free, low OPEX, renewable energy based systems involving local entrepreneurs for maintenance and operation, including backhaul connectivity and service provisioning. These solutions need to be emulated throughout the country to help the spread of broadband.

It goes without saying that regulators must play a facilitating role and adopt a light-touch/hands-off approach to encourage innovation as well as cost reduction through the removal of any artificial levies. Also, the franchisee arrangement between the service providers and local entrepreneur/communities has to be permissible without any onerous conditions. As an immediate step, the regulator should create a category of "class licence" for local service providers with light regulatory conditions and obligations. One such example, from a World Bank report, is shown on the next page.

Licensing local operators - class licensing

Niche licenses for local operators allow specific solutions targeted for small towns. By this, governments support local entrepreneurs and increase their sustainability by allowing revenues from on-net communications.

Vendors are developing solutions for such local-oriented models. Nokia Siemens Networks (NSN), for instance, is currently testing its "Village Connection" model in India. This model allows entrepreneurs to manage a GSM access point in their community. The access point can manage call completion within each village (supporting up to 80 subscribers) with a standard personal computer, reducing investment and the need for communication with regional access points (done in IP and only for long-distance calls). However, this model may not require the establishment of a local license regime if a franchise or reselling approach is adopted.

In the Dominican Republic, the Dominican Telecommunications Institute (Indotel), the regulatory agency, launched in 2007 a rural broadband tender aimed at installing broadband connections for 500 communities under an output-based aid (OBA) scheme. These points of presence have allowed local entrepreneurs that already were operating telecenters (known as "Informatics Training Centers") to work as local ISPs within their communities, offering broadband Internet access to private users and VoIP.

The main characteristic of this approach is that it gives the opportunity for local entrepreneurs to serve their communities with tailor-made solutions in a self-sustainable manner, leveraging low-cost technical solutions and minimizing public funds requirements.

The way forward

i) What has been done

1. Adoption of the NTP-2012 policy envisioning "Broadband for All" with ambitious targets of 175 million by 2017 and 600 million by 2020 with broadband speed reaching 100Mbps.
2. USO funding of NOFN for 4 billion USD and creation of BBNL.
3. Tripartite Agreement with state governments for free rights of way.
4. Pilot projects for NOFN in 3 states.

ii) Work-in-progress

1. Execution of NOFN through government PSUs: BBNL, BSNL, Railtel and Powergrid.
2. Tendering for passive and active equipment.

iii) What is required

1. Involvement of industry in NOFN through PPPs and timely execution.
2. Planning for and funding of access networks in rural areas.
3. Creation of niche "class licence" for broadband services.
4. Making more Wi-Fi spectrum licence-exempt.
5. Extension of VLE concept to VLBSC through community participation/support.

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