Innovating India: Roadmap for 2019-24
Challenges of Last Mile Connectivity

By Osama Manzar, Zothan Mawii and Udita Chaturvedi

Background

It has been 27 years since the World Wide Web was first accessed by the public, courtesy Tim Bernes-Lee, however half the world is still struggling to get its first access to the Internet even in 2018. A large share of this unconnected population resides in India where only 30 per cent of the population accounts for Internet users, according to the World Bank[i].

According to a report titled Mobile Internet in India 2017, published jointly by the Internet and Mobile Association of India (IAMAI) and KANTAR-IMRB, the number of Internet users in India was expected to reach 500 million by June 2018[ii], however, it would be unfair to assume that this figure is equitably spread across the Indian geography and demographics. As per the same IAMAI report, while Internet penetration in urban India stood at 64.84 per cent in December 2017, mobile Internet penetration in rural India remains as low as 18% per cent. On one hand, there are the "digitally included" who have moved from 2G to 4G, and soon would move to 5G. On the other, thereare those who are yet to own a mobile phone or experience telecom connectivity in their regions. While private telecom companies have reached a considerable population in rural India, there are still several villages in India that lie in complete information darkness with no access to telecom services or the Internet.

Globally, most of those among the 3.5 billion 'connected' individuals of the world are people who are largely economically empowered, literate and reside in urban areas. As the world moves more information and services online, and with the great push to 'Digital India', inequalities are being exacerbated further. In order to bring about last mile connectivity, it is crucial that we look towards alternative methods to connect the rest of the world. We need innovation in technology, business plans and methodology.

Earlier this year, the government published a Draft National Digital Communications Policy 2018 (DNDCP 2018), which takes a comprehensive and holistic view of the increasing digital penetration in India. The vision and objectives laid out in the DNDCP 2018 are clear, focused, and laudable. Further, its three-point mission of Connect India, Propel India and Secure India showcase a promising future for India. The DNDCP has a dedicated a section to connecting the population that still remains Internet-dark, it has identified Spectrum as a key natural resource, promised to create jobs in the digital communications sector, it has supported Industry 4.0, and supports the idea of shared infrastructure between smart cities. These recommendations have been accepted by the Department of Telecommunications and remain to be implemented.

In this policy paper, we will advocate the use of certain strategies and technologies that should be implemented to achieve last mile connectivity by 2024.

Strategies to achieve last mile connectivity – 2019-2024

1. **Successfully complete the implementation of BharatNet to provide functional internet connectivity to gram panchayats**

BharatNet, formally known as the National Optic Fibre Network (NOFN), was launched in October 2011 as an ambitious initiative to connect all 250,000 gram panchayats of India to the Internet. The mission of BharatNet mission is to provide 100 mbps broadband connectivity to all gram panchayats and be a catalyst for increasing broadband penetration in rural areas so as to foster socio-economic development. This mission on paper is empowering for millions of Indians who live in rural parts of the country.

- The promised objectives of the Bharat Net project should see its fruition. Infrastructural work may have been completed under Phase 1 but gram panchayats and their residents remain without functional internet. Deployment of broadband internet and skilling of panchayat officials should be undertaken with immediate effect.

- Provide individual households with atleast 50mbps broadband internet connectivity through the panchayat office

- Provide all institutions, government buildings, and educational centres with atleast 50gbps broadband internet connectivity

2. Promote and deploy community networks to connect rural and hard to reach areas

For the past 10 years, Digital Empowerment Foundation (DEF) has been using innovative and frugal approaches to achieve last mile connectivity. The biggest barrier to widespread connectivity is the high cost of infrastructure. With most telecom companies unwilling or unable to build infrastructure in far flung and rural areas large swathes of the country have remained internet-dark. To overcome this, DEF has been setting up community networks. Using unlicensed spectrum from an available backhaul from existing mobile towers and line-of-sight technology, internet connectivity can then be distributed to households within a 20 meter radius.

- Train local people with technical skills to maintain the network. The biggest challenge that community networks face is the problem of technical skills. Individuals from the community should be trained and given technical skilling to maintain the community network and become self-sustaining.

- A spirit of entrepreneurship should be encouraged among community members in the running and maintenance of the community network. This will, in time, cover the costs required for technical maintenance of existing physical infrastructure, improvements that need to be made, and associated costs of spectrum etc.

- Various community ownership or co-operative models should also be explored to maintain community networks

3. Community radios should engage with community networks in order to increase internet connectivity coverage

- Community radios have the existing infrastructure to set up community networks and distribute internet connectivity – infrastructure in the form of radio towers, presence in rural areas, and a relationship with

community members. These should be leveraged and with extra skilling and minimal costs, internet connectivity should be distributed to community members.

4. Ease regulations on licensing to allow individuals and NGOs to become Internet Service Providers

-Individuals and non-governmental organisations should be allowed to distribute internet connectivity. Currently the process to get a license is a long and arduous one with many restrictions. Ease regulations so that citizens living in rural areas are not dependent on large telecom operators and their business interests.

- Private ISP players don't see enough return on investment in entering all rural, tribal and backward regions of the country. Eased regulations would ensure that citizens at the last mile are not solely dependent on large telecom operators and their business interests.

5. Lift restriction on using TV white space spectrum to provide wide and reliable Internet connectivity

White Space refers to the unused broadcasting frequencies in the wireless spectrum. Television networks, in particular, leave gaps between channels for buffering purposes, and this space in the wireless spectrum is similar to what is used for 4G and can be used to deliver widespread broadband Internet.

- A quantitative assessment of TV UHF band in India by researchers at IIT Bombay[iii] shows that in the 470-590MHz, a major portion is unutilized. The unutilized UHF band can be used for affordable backhaul. Signals from this spectrum have a much longer range than those currently used for Wi-fi.

- Microwave links require line-of-sight (LOS) between the points being connected. In areas with rugged or forested terrain, the tall towers necessary to provide this line-of-sight connection make microwave an expensive and unfeasible solution which is why many telecom operators neglect certain areas. TV White Space technology provides an effective alternative to microwave by utilizing the lower-frequency UHF signals that can penetrate obstacles and cover uneven ground without requiring additional infrastructure.

- Using this unused spectrum to provide Wi-fi will require fewer base stations for better coverage, thereby increasing efficiency at a lower cost and providing better and more reliable service to users.

- Currently only various educational and research based organisations have access to this for the sole purpose of carrying out experiments. The COAI has objected to de-licensing the 470-698 MHz band arguing that it would trigger market distortions. However, this available, technological element should not be left unused and untapped when its benefits are so vast.

6. Deploy public Wi-Fi hubs across the country

- Public Wi-Fi hubs should be deployed across the country as set out in the DNDCP 2018. The policy targets 5 millon Wi-Fi Hotspots to be set up by 2020 and 10 million by 2022.

- Public spaces like airports, railway stations, public libraries, public museums, and public institutions should be provided have public Wi-Fi in order to benefit citizens and tourists alike

- TRAI also recommends that Public Data Offices (PDOs) should be allowed to resell Internet services through yesteryears PCOs type set-up. The regulator had recommended that like cyber cafes, which provide internet access to public after registering themselves, PDOA should be allowed to provision internet access services after registering themselves with the telecom department.

- Public Wi-Fi should focus on Tier 2 and Tier 2 cities, towns, and villages which remain neglected by private service providers.

Recommendations

1. Deploy community networks in order to reach unconnected, hard to reach areas.

2. Promote and leverage community radio stations to use existing infrastructure to set up community networks and become ISPs

3. Ease regulations to allow individual persons and NGOs to provide internet services to community

4. Lift restriction on using TV white space spectrum to provide wide and reliable internet connectivity to all users

5. Deploy public wi-fi hubs across the country

The strategies discussed in this policy paper aim to create a digitally enabled and a digitally empowered equitable society by 2024, and it largely on understanding that one single magical solution cannot connect all 1.25 billion+ Indians to the Internet, especially given our vast geography, population and income inequalities. The solutions thus lie in innovative approaches to technology. Connecting India was never going to be an easy task. However, if the government wants to promote a digital India, and encourage digital payments and digital identification in exchange for entitlements and public services for the most marginalised communities, providing affordable and functional Internet connectivity should be bare minimum requirement.

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[i] Individuals Using the Internet (% of Population). *Data*, The World Bank, 2016, data.worldbank.org/indicator/IT.NET.USER.ZS?locations=IN.

[ii] Agarwal, Surabhi. â€œInternet Users in India Expected to Reach 500 Million by June: IAMAI.â€Â *The Economic Times*, Economic Times, 20 Feb. 2018, economictimes.indiatimes.com/tech/internet/internet-users-in-india-expected-to-reach-500-million-by-june-iamai/articleshow/63000198.cms.

[iii] http://grammarg.in/wp-content/uploads/2017/05/TVWS-Assessement-India2014.pdf