Comments from Infosys Technologies Ltd. *for consultation paper by TRAI on "National Broadband Plan"*

Raghuveer B K ***raghubk@infosys.com***

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Issues for Consultation:

2.23 a. What should be done to increase broadband demand?

There are many things that need to be done to increase broadband demand in India. However, there are few fundamental things that need to be done.

Promote Broadband based solutions ecosystem :

People do not directly consume bandwidth. The actually use service or utility or information or entertainment on top of the broadband network. In mobile voice network, cell phone connectivity by itself is good for people to use because the content (talk) in this case is generated by people themselves. In the case of broadband data network, connectivity is just an enabler for a services, utility, information or entertainment that can be accessed over broadband network. Like the amazing success story of online Railway booking, more such public services should be available online.

If services or information is not available or not useful for the user, broadband connectivity is not required and hence demand will be low.

Computers should not be the only source of broadband usage :

In a country where literacy in general and computer literacy specifically is fairly low, expecting usage of computers to drive broadband growth is not realistic. Even if computers are made available, people will still need to learn how to use computers. This is a challenging task because the user interfaces on computers keep changing and we cannot expect a large percentage of the population who are computer illiterate to keep learning this. In addition to this issue, most PC based applications/web pages are in English. This would not be of much use to a large population of the country. Any information or entertainment in the form of Video or Audio is what would be understood by 100% of the Indian population. TV sets are there in more than 100 million homes in India and pretty much anybody knows how to operate a TV.

Video on Demand over Broadband with the ability to provide audio in local languages as required across the country is the only way Broadband can be useful across the economic classes of the country. While the rich class would use VoD for HD entertainment, it would be greatly useful for the rural class for Information and Education.

Broadband deployment cost optimization.

In a country where subscribers are very price sensitive, it is very important to deploy technologies and end-2-end solutions that are cost-efficient and future proof. When broadband technologies that can only provide web browsing, email and such basic services are deployed, subscribers do not see much value in paying anything more than Rs.150 per month for broadband connection. Very importantly, such services will be provided by even low speed GPRS data connectivity and hence the need for high speed broadband is not felt.

Cost efficiency by lower tariffs or deploying decade old wireline broadband technology does not help the cause of broadband in India. In a country where there may be high end bungalows, offices, kirana shops, middle class apartments within a 3km radius, it is very important to have broadband equipment designed to cater to such unique needs of India.

The cost of in-home wiring and provisioning of new connections can also be optimized by making it mandatory for builders to wire up new homes for broadband very similar to how they wire up for electricity. Telephone cabling for voice is not sufficient. Such initiatives would reduce the cost of installation for service providers.

Next gen Broadband technology and solutions have to be designed for the unique needs of India.

2.23 b. What, according to you, will improve the perceived utility of broadband among the masses?

At a macro level, there are a few things that are very important for the citizens of the country : education, livelihood, health, entertainment and time. Use of broadband to help in any or all of these basic needs will improve the quality of life for the common man. When broadband is used to provide services around these basic needs, the utility of broadband for the masses is automatically improved.

We need to enable courses and video lectures on skill development, personality development, vocational training, engineering and medical available across the country over Broadband. A silkworm farmer worried about diseases should be able to watch a video created by Silk Board of India on the community TV set, which is powered by VoD over Broadband. It should be as simple as a number assigned to provide information on diseases and when punched on the remote, the relevant videos will start playing. It should be as simple as watching a TV channel by them today on cable TV.

Specialist doctors in Tier-1 cities should be able to provide basic diagnosis for masses in rural India over broadband connectivity. A pregnant woman in rural India should be able watch a video about nutrition on a community TV set.

When such services add value to everyday life, the masses will use the technology without even bothering to understand it. Masses today buy cell phones because they want to talk to others and not because of the technology behind it. They are not even bothered about the technology that powers it. Unfortunately, all service providers in India sell broadband based on technology (256kbps, 2Mbps, etc) and not based on services. This would mean that only the urban technology savvy people feel the need for broadband.

2.23 c What measures should be taken to enhance the availability of useful applications for broadband?

Indian Government has to setup the basic infrastructure that would enable creation application eco-system. Once this basic infrastructure is setup, both government organizations and private organizations will make use of this infrastructure. Since connectivity will be a basic need when such infrastructure is setup, broadband growth will automatically happen.

The following two basic infrastructure initiatives have to be taken up at a National level.

1. National Cloud Infrastructure.
    - This would enable government and SMEs to efficiently use applications on this cloud infrastructure without heavy upfront investments individually. Increased computerization of businesses will add a new level of efficiency and hence broadband connectivity will become a basic necessity.
2. National On-Demand Video Infrastructure.
    - This would enable all government departments, educational institutions, medical institutions and NGOs to provide education, information and entertainment as Video that can be easily consumed by masses of the country. Video content can be the same across the country with the audio content automatically selected based on location.

We believe that such infrastructure investment will pay for itself when it can reach millions of eyeballs.

If wireline broadband quality and growth does not happen in India, even the urban rich class will be probably years behind the rest of the world when it comes to living room entertainment. Wireline broadband technologies like xDSL, xPoN are the only means to provide on-demand HD Video, on-demand 3D Video, multi-player gaming and other such services. We are currently in a state where the rich class may be willing to pay, but services are not there.

2.23 d. How can broadband be made more consumer friendly especially to those having limited knowledge of English and computer?

Please refer to comments made above on VoD, Community TV and National on-demand Video infrastructure.

2.35 a. Do you agree with projected broadband growth pattern and futuristic bandwidth requirements?

Bandwidth requirements in India may vary between the different economic classes. While the urban rich would need a minimum of 24Mbps, the masses may need a bandwidth of minimum of 2Mbps.

In India, there may be a need to understand the difference between Internet content and walled garden content. Service providers may need to provide best possible bandwidth on content hosted in the walled garden, which commercial considerations may dictate bandwidth made available for Internet content.

2.35 b. Do you agree that existing telecom infrastructure is inadequate to support broadband demand? If so what actions has to be taken to create an infrastructure capable to support futuristic broadband?

Existing Access Infrastructure is surely inadequate to support broadband demand.

Access network design and access equipment specifications will need to be done based on unique needs of India, without compromising on the need for future proof technology. We are already about 5 years behind the rest of the world in Broadband access infrastructure. While cost is a very important factor for a developing country like India, deploying access networks based on legacy network gear or network design will only harm the cause. Cost efficient end-2-end network solutions based on next generation access technologies is what needs to be focused on. Wireline Broadband equipment that can only provide services like email or web browsing is a wasted investment because wireless broadband technologies will anyway provide these services in a more useful manner.

3.22 a. What network topology do you perceive to support high speed broadband using evolving wireless technologies?

No comments.

3.22 b. What actions are required to ensure optimal utilization of existing copper network used to provide wireline telephone connections?

Traditional methods of local loop unbundling to ensure optimal utilization of existing copper network may not necessarily work in India for a variety of reasons. There are alternative innovative solutions possible that may be specific to India that would enable sharing of existing copper network without hurting the business interests of incumbent provider.

3.22 c. Do you see prominent role for fibre based technologies in access network in providing high speed broadband in next 5 years? What should be done to encourage such optical fibre to facilitate high speed broadband penetration?

xPoN based technologies will play a key role in access network in the very near future. In the case of urban rich, xPoN may be the access technology for every home and in the case of rural masses, this may be the technology that provides community based services.

Considering that a large percentage of new homes that would be built in India in the near future would be MDU/MTUs, the task of providing fibre based access technologies will be that much easier.

Town planning agencies should consider facilities for broadband very similar to how they plan for water, electricity and sanitary connections. This will reduce the overall cost for service providers and hence facilitate better penetration and at a competitive price points for the subscriber.

3.23 d . What changes do you perceive in existing licensing and regulatory framework to encourage Cable TV operators to upgrade their networks to provide broadband?

No Comments.

3.39 a. Is non-availability of optical fibre from districts/cities to villages one of the bottlenecks for effective backhaul connectivity and impacts roll out of broadband services in rural areas?

No. Roll out of broadband services in rural areas will not be successful as long as we are focused on providing bandwidth to rural areas. There is a comprehensive plan required to understand the services that would be provided to rural masses, based on which network design has to be done. Even for the remotest of villages which does not have any backhaul connectivity, a local broadband based VoD network can be setup where the content gets refreshed using one-way Satellite connectivity. Hence, it is important to first define services for rural areas and then define backhaul connectivity or network design.

3.39 b. If so, is there a need to create national optical fibre network extending upto villages?

We think that the existing networks of BSNL and other agencies like RailTel, etc should be utilized or extended to reach villages.

3.39 c. In order to create National optical fibre core network extending upto villages, do you think a specialized agency can leverage on various government schemes as discussed in para B?

A specialized agency can be created such that they make use of all the existing networks or extend them where required. This agency should be more a single window for all rural connectivity, facilitating with various government agencies who have backbone networks.

3.39 d. Among the various options discussed in Para 3.35 to 3.37, what framework do you suggest for National Fibre Agency for creating optical fibre network extending upto village level and why?

No comments.

3.39 e. What precautions should be taken while planning and executing such optical fibre network extending upto villages so that such networks can be used as national resource in future? What is suitable time frame to rollout such project?

No comments specifically, but would like to comment that this opportunity to create a optical fibre backhaul network and access network should be used as a opportunity by Government of India to encourage indigenous IP creation, design and manufacturing.

4.18 a. Is there a need to define fixed and mobile broadband separately? If yes, what should be important considerations for finalizing new definitions?

No comments.

4.18 b. Is present broadband definition too conservative to support bandwidth intensive applications? If so, what should be the minimum speed of broadband connection?

2 Mbps should be the minimum speed of broadband connection.

4.30. What specific steps do you feel will ease grant of speedy ROW permission and ensure availability of ROW at affordable cost?

No comments.

4.42 a. Does the broadband sector lack competition? If so, how can competition be enhanced in broadband sector?

Yes. There needs to be more broadband service providers. Innovative solution for making use of available copper network without impacting the business interest of the incumbent will need to be implemented.

4.42 b. Do you think high broadband usage charge is hindrance in growth of broadband? If yes, what steps do you suggest to make it more affordable?

Broadband is an efficiency driver and hence will only shift spend from some existing inefficient service to a more efficient service on broadband. When such services are not available, any charge will look expensive just for email or web browsing services on broadband.

A HD Movie DVD costs in excess of Rs.2000 currently. A HD Movie can be streamed over a broadband network by a service provider to a HD TV set at one tenth this cost, but such services are not available.
People buy railway tickets online even if a service charge has to be paid.
If 200 million people in rural India watch on-demand educational or livelihood videos for 1 hour a week, there is huge monetization potential from that.

Reducing usage charges may not be the answer for triggering broadband growth.

4.42 c. Do you think simple and flat monthly broadband tariff plans will enhance broadband acceptability and usage?

As discussed earlier, value and utility of services on top of broadband will be the only way to enhance broadband acceptability and usage.

4.42 d. Should broadband tariff be regulated in view of low competition in this sector as present?

No.

4.42 e. What should be the basis for calculation of tariff for broadband, if it is to be regulated?

No comments.

4.42 f. How can utilization of International Internet bandwidth be made more efficient in present situation?

No comments.

4.43 g. How can use of domestic and international internet bandwidth be segregated? Will it have direct impact on broadband affordability? If so, quantify the likely impact.

Yes. This is a very interesting point that needs detailed discussion. This will also encourage creation and hosting of local content. This will have an impact on broadband affordability and more importantly, better speeds and hence experience for the subscribers. Impact quantification may need more study and hence no comments on this point currently.

4.48 a. What steps should be taken to bring down the cost of international internet bandwidth in India?

No comments.

4.49 b. How can competition be enhanced in the International bandwidth sector?

No comments.

4.59 a. QoS of broadband, availability of bandwidth, adherence to given contention ratio, affordability, availability and spread are some intricately linked parameters. In your opinion what should be done to ensure good quality broadband to subscribers?

Wireline Broadband access equipment will play a key role in delivering next generation services over broadband. Minimum specifications that should be supported by broadband service providers should be defined by the regulatory body. This will help ensure a basic level of QoS and QoE to subscribers. In addition to this, power consumption, card/rack density and important features should be defined to ensure any broadband network in India will be able to support triple play services, at the bare minimum.

4.59 b. Do you think that bad quality of broadband connection is impacting the performance of bandwidth hungry applications and hence crippling the broadband growth? If so, please suggest remedial actions.

Yes. Bad quality connectivity may be because of many factors. However, performance of broadband network because of broadband access devices can be managed better. Regulator can specify minimum technical specifications that need to be satisfied like HA configuration, port density, switching capacity, QoS features, etc.

4.59 c. Is there a need to define new/redefine existing quality of service parameters considering future bandwidth hungry applications, time sensitivity of applications and user expectation? What should be such parameters including their suggestive value and should such parameters be mandated?

Can be provided later. Needs detailed effort.

4.64 What measures do you propose to make Customer Premises Equipment affordable for common masses? Elaborate your reply giving various options.

No comments.

4.68 What measures are required to encourage development of content in Indian vernacular languages?

Websites will not be able to drive broadband growth in India. A lot of content may be hosted by private parties who do not have a business interest in creating vernacular language website versions.

Video will be the driving force to enable usage of broadband by the non-english literate subscribers. On-Demand Video infrastructure over broadband networks is the key to enable a larger population to the country to utilize the power of broadband.

There can be a Video creation eco-system that can be created in the country where useful videos can be created by both government agencies, individuals and NGOs. The audio associated with the video can be dubbed in different languages based on regions where it gets played.

For a non-english literate subscriber, the experience is pretty much the same as cable TV today, except that they have unlimited number of channels. A coconut farmer in Kerala will know that channel "45222" will play videos related to pesticides that need to be used. A tractor company will indicate that channel "92729" should be viewed to understand how the tractor has to be maintained. This "channel number" just corresponds to a particular video in the VoD library.

The cost of a IP-STB can be as low as Rs.1000 with high volumes and can be used with the TV Set that they will anyway have.

4.71 a. Do you perceive need for any regulatory or licensing change to boost broadband penetration?

Encouragement and funding should be provided to companies that own indigenous broadband technology to build out PoCs or solution concepts. This will help design and develop solutions that are India specific. Without India specific solutions, broadband penetration will lag behind the rest of the world.

4.71 b. Are there any specific competition and market related issues that are hindering growth of broadband?

Procurement of lowest cost broadband equipments by government owned service providers may hinder the deployment of next generation services and hence hinder growth of broadband. The lowest cost should be based on a future proof specification that can deploy next generation services, thus enabling lowest cost overall solution and not just for one piece of equipment.

4.72 c. What other fiscal/non-fiscal measures should be considered to boost broadband penetration?

National Broadband Solution center can be setup by the government in collaboration with Indian companies, IITs and other reputed institutes. This lab can be used by government agencies, IITs and Indian companies to create broadband infrastructure and solutions. Services that have potential can be deployed on service provider networks, enabling boost to broadband penetration.