

**VODAFONE ESSAR RESPONSE TO TRAI
Consultation Paper No. 09/2010 ON**

National Broadband Plan

INTRODUCTION

Broadband is being accorded the status of a very basic social infrastructure like power, water and transport facilities to which citizens of a country have a right to demand compulsory access. And it is not difficult to see the reason why this is so. The Authority itself has highlighted the key reason for this: according to a World Bank study a 10 percentage increase in broadband penetration leads to a 1.38 percentage increase in per capita GDP in developing economies. This finding is the average of several countries' data. For India, the benefit could be significantly higher still, because, for even for plain vanilla 2G voice telephony, on India - specific study by ICRIER showed as much as 1.2% increase in GDP for 10% penetration increase. Thus a huge economic benefit flowing out of the availability of broadband is a very attractive possibility for India. This is a huge economic benefit flowing out of the availability of broadband.

In fact, the enormous economic benefits of the mobile phone are evident in India and broadband has the potential to deliver a much higher impact on incomes and GDP. This in itself is incentive enough to drive adoption and use of broadband in such a way as to transform the lives of people and businesses in the country.

However, it is also important to note that – unlike telephony, which is driven by a need to communicate – a host of other factors play a strong role in driving up demand for broadband and its adoption. The economic benefit flows from use and this in turn is driven by the utility on offer.

Perhaps this element is the missing link in broadband adoption in India. Studies have shown in other parts of the world that a large part of broadband demand is driven by Internet usage. Access to broadband does not always translate to usage. This is influenced by factors like the socio economic group, the levels of education and the perceived benefits on account of useful applications and information being available.

In a country like India, this would also be influenced by regional variations of language and culture and a simultaneous effort to develop region and ethnicity specific content, applications etc would play a big role too. We try to expand on these themes in our responses to the questions below.

There are examples of this in other countries too. For example, Portugal's initiative to increase adoption of Internet usage by students both in schools and at home played a big role.

It is further relevant to note that rolling out broadband infrastructure itself is an expensive proposition and a subsidy or support from the USO fund would go a long way in helping achieve the desired penetration levels – both wireline and wireless coverage to remote areas of the country.

However, we would submit that a cautious, well planned approach is extremely important for this. The real question is to decide whether we want to stress on the importance of a ubiquitous broadband network at lower speeds – available to all – or we want to focus on availability of extremely high capacity superfast broadband – which would be extremely expensive too.

Examples of this are Germany which intends to cover its entire territory with a 1Mbps service and 75% coverage of the country with a 50Mbps service. By contrast, the United Kingdom has set a target of

2Mbps for ubiquitous access and expects a 50Mbps services to be deployed to around 40% of the country. Australia on the other hand has stated its ambition to provide high speed 100Mbps services to 90% of the country. Different priorities drive these different goals.

As might be expected the levels of investments to achieve these targets depends on the goals being set. So the government of Australia's plans for a superfast broadband network will cost an estimated 43 billion Australian dollars (or roughly 30 billion Euros) and is estimated to take more than eight years to build with roughly 25,000 full-time workers. Germany, with a population roughly four times as large as Australia's, on the other hand is likely to spend just €150 million.

Which model would be the clear winner for India? In our view, the immediate objective should be to ensure availability of widespread coverage at a basic minimum speed (at the standard defined 256 kbps by TRAI today). Even this basic minimum access would be a huge enabler.

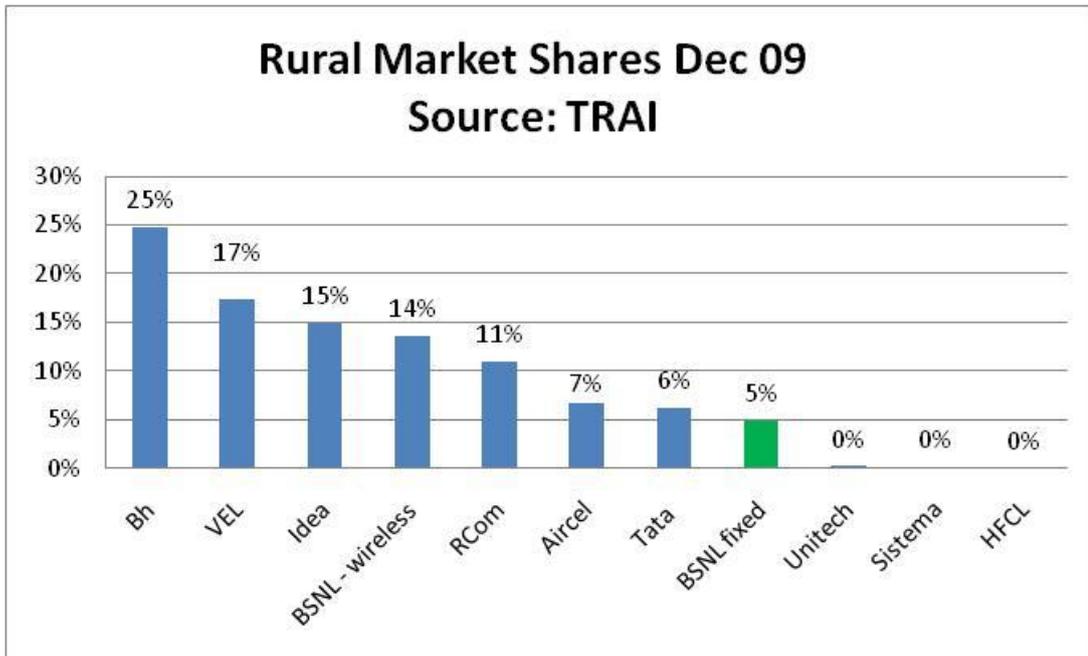
Over time as the multiple mobile broadband networks (like 3G/LTE and BWA) are rolled out the basic minimum speed can be scaled up to 1 Mbps or 2 Mbps download speeds – which would drive delivery of really good quality applications on video and rich multimedia. Higher speeds (of up to 50 Mbps download or more can be planned for over the next few years.

The following could serve as yardsticks to frame a model or to arrive at an enabling decision based on the benefits of broadband:

1. **Assess the immediate value creation:** GDP effects from direct network investment in remote and rural areas would encourage job creation and thereby deliver economic prosperity.
2. **Multiplier Effects:** Impact of broadband investment on equipment suppliers, content developers, governance delivery and business.
3. **Productivity increases:** More efficient and sophisticated business processes, enabling higher output, greater economic-value-add and related benefits
4. **Human / Societal benefits:** increased use of knowledge skills, improved access to information, health care, education and technological prowess

We would like to submit that the following should be the key principles to drive the Authority's recommendations on broadband:

- The Authority is correct to focus not only on issues of supply, but how to stimulate demand. The two have to go hand in hand.
- It is also relevant to note that the greatest successes in increasing penetration, particularly rural penetration in India – as in all emerging markets has been via wireless (wireline is an important part of the eco-system but cannot succeed in providing universal coverage in the time frames required to derive the benefits for our economy).
- 95% of rural connections in India are provided over wireless technology:



This is important because of the unique characteristics of the Indian telecom environment.

Policy and regulatory measures designed to promote broadband must take account of the fundamental fact that the primary delivery method for data services including broadband data services is more likely to be wireless than wireline. In this context we would like to quote from a unique study conducted by ICRIER (which was supported by Vodafone) released in January 2009:

The most serious problem facing India surrounds data services. India's current position, by international standards, is lagging. The rest of the world is increasingly concerned about increasing access to high speed data rather than voice connectivity.

*High-speed data services and the internet are seen as a critical capability that will drive future global competitiveness in technology and services. For India, and the rest of the developing world, **data services will be delivered by wireless broadband access rather than fixed line copper or fibre networks.** The delivery of worldclass data services requires very large blocks of spectrum. A major strategic plan for data services is urgently required to plan the availability of sufficient spectrum.*

Thus, this consultation is a great opportunity to deliberate and evolve a well laid out plan out for the next five years that will bring data within reach for the unconnected. To get there, it is extremely important that the policy and regulatory measures must be agnostic to technology – operators should be able to compete without competitive distortions.

RESPONSES

Question 1:

What should be done to increase broadband demand? (Reference Para 2.23)

To increase demand for broadband, a key requirement is to increase supply of broadband infrastructure. But equally important is the need to encourage usage. Broadband adoption will be driven by increased Internet usage. So efforts to boost use of Internet would be a key driver for broadband demand.

The simple **availability** of access to broadband is unlikely to be a big driver of demand when the current availability and take-up of broadband in India remain start from such comparatively low levels.

It is interesting to note the different approaches adopted by other countries to drive up demand for

broadband. The key starting point has been the need to provide reach – ubiquitous availability – of standard speed (that is 256kbps or even 144 kbps in the case of India) broadband to all. Notably this is the approach adopted by UK, Germany, Italy, Finland, Ireland and many European countries.

The manner of government intervention also varies. In some countries, governments provide direct financial assistance. In others, intervention focuses on encouraging consumer demand – with more e-applications, software for enabling e-commerce and empowering those who are on the other end of the digital divide to be able to use broadband.

There are other models that are more market led, facilitated by a regulatory framework which seeks to develop competition and encourage efficient investment in infrastructure – this would take the form of encouraging entrepreneurial expansion of broadband services – broadband kiosks, PCOs etc.

The demand driver will be wireless broadband (3G, BWA and a host of other emerging technologies that will soon be rolled out in the country).

Wireless will be the enabler for broadband the same way mobile phones were for voice a few years ago.
Data penetration and use will be led by wireless technologies sooner than expected.

Question 2: What, according to you, will improve the perceived utility of broadband among the masses? (Reference Para 2.23)

Primarily, perceived utility lies in the amount of economic value that users are able to derive from the availability and use of broadband.

In urban areas, the key driver is communications, social networking and peer to peer information sharing. In more remote and rural areas, it is the ability to use it as a productivity enhancer, be it online commerce, banking and transactions, government interface and documentation, tax and land records, birth and death certification etc.

Further, there is a need to remove the perceived association of computers with access to the internet and broadband enabling new business applications from users' minds. Wireless broadband will sweep in along with a host of end user devices that connect to the network and revolutionise the entire value proposition – everything from social interaction to news and information dissemination, from voice communication to mobile commerce is being redefined with the availability of devices like the iPhone, Android phones, Windows mobile phones, Blackberry and a host of other smart gadgets, as well as simplified low-cost versions of these access devices which will provide core services – email, video, internet access – to a mass market at lower prices.

These are platforms on which applications can be delivered on the move in simple, compact, easy to use formats and they are multi-dimensional enough to serve as a utility device, without the shortcomings of a PC.

Perceived utility is also dependent on awareness levels and how broadband can enhance productivity, quality of life and benefit society – for this, availability of the right applications, like education, e-health etc at the right price points will be key.

Finally, utility will be derived from usage. Promotion of the benefits of Internet usage to non-users would be a big contributor towards this. Consumer education and free trials of the Internet in remote locations, demonstrating its use in delivering content, entertainment, health benefits and education would all go a long way in promoting perceived utility.

Delivery of e-health for example would be a very strong driver of broadband adoption. This is clearly an area for the government to drive. Medical devices networked wirelessly and inter-operably and Integration of Tele-health activities with Secure Electronic Patient Records and Hospital Management Systems would be a huge boost for broadband network expansion.

Question 3: What measures should be taken to enhance the availability of useful applications for broadband? (Reference Para 2.23)

It should be noted that the most successful and valuable communications applications were often almost accidental and perceived initially as unlikely to take-off (the telephone, email, internet access). On the other hand, many applications which were perceived as likely to be enduring highly sought after services either never took off, or quickly became superceded by other technologies (pagers, mass-market video-calling). It is therefore difficult to predict the applications which will success or fail. It may be better therefore to encourage investment in education around the basics of communication usage to enable demand, rather than to try to pick "winners" and "losers" from possible future applications.

As mentioned earlier, one of the key drivers for broadband adoption will be availability of the right value.

One possibility is to make available targeted rather than general content / programmes that are suited exclusively to the divergent needs of users in different geographies. The needs of a tele-worker in an urban set up (connected to a factory or office environment) would be different from the needs of a craftsman in a remote location.

Towards enabling this, large government supported initiatives would be extremely important. Funding and financial support to entrepreneurs and service providers to help them generate and maintain localized, packaged content – in various regional languages would be a big help.

Similarly, initiatives to support creation and delivery of local entertainment solutions and content over broadband networks would work better by driving up interest and internet use – and thus fueling broadband adoption.

Third party applications for broadband networks can be provided with economic and tax incentives to encourage greater investments and more interesting and useful services that customers can access.

Easy access and availability: subsidy based broadband access centers in post offices across the country, educational institutions (schools, universities, colleges etc) and local libraries, kiosks in local markets in remote regions and other ways of increasing public access points will drive the use of broadband services.

Question 4: How can broadband be made more consumer friendly especially to those having limited knowledge of English and computer? (Reference Para 2.23)

Regional content in vernacular languages is the only means to do this in a country as diverse as India. Initiatives like inclusion of local language support to mobile keypads and keyboards are already driving this forward. The government has a strong role to play in this.

Then as mentioned above, availability of software in the user's own language would serve as a big driver. Compelling localized content will drive up adoption of broadband.

Increased consumer education and training in the use of broadband would also facilitate adoption.

Question 5: Do you agree with projected broadband growth pattern and futuristic bandwidth requirements? (Reference Para 2.35)

While growth is important, we feel there is a need to focus on penetration of broadband to truly harness its benefits. The ICRIER study clearly demonstrates this effect through its study. In mobile telecommunications, according to the report, there is a clear evidence of a critical mass, hovering around a penetration rate of 25%, beyond which the impact of mobile on growth is amplified by network effects.

This provides an important benchmark for policy makers to evaluate at what stage exactly the benefits of broadband penetration would start contributing to economic growth. Though there is a rapid growth of mobile telephones, there are still enormous variations between states, urban and rural areas and between poor and rich households in cities. This pattern will be true for broadband.

Further, demand could be of two types: for bare connectivity to the Internet – by those who do not even have any coverage today; and for higher bandwidth based on usage for those already connected.

Mobile networks have reached some of the remotest parts of the country and are capable of providing access to at least the basic broadband needs of customers (which can be supported at minimal data speeds). These networks will, with 3G and other high end technologies being deployed, be able to offer high speed too.

Broadband growth will be driven by a combination of factors and projections are only estimates assuming all the pieces are in place. Bandwidth hungry applications – e-education, e-health e-agriculture etc - will drive up the capacity demands.

As of June 2010, according to various market estimates globally there are more than 500 million mobile broadband users – users who are able to download at speeds of up to 3 Mbps or even higher. By 2015, there are some estimates that expected this to reach 3 billion mobile broadband users or more around the world.

Availability of the network itself will be the key. The existing mobile networks are already delivering fairly good GPRS and EDGE based services. With 3G and BWA networks coming in soon, choice of a mobile broadband access will not be a limiting factor for users. They will however have to find a use for it.

Most of the rural and remote areas would find utility in having this as an economic tool and productivity enhancer as a first step. Adoption would be driven by availability of applications like e-commerce, e-education, e-health, e-agriculture, e-mobile transactions and other economic activities would be the most intensive drivers. It will also be fueled by for social networks and content sharing. Applications hold the key to more usage and the demand for more bandwidth and capacity.

Question 6: 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? (Reference Para 2.35)

There is very little alternative to wireless infrastructure if we wish to connect vast stretches of our country quickly and at least bring some kind of digital inclusion for those who are unconnected. Upgrading these to higher capabilities could be a subsequent effort to cater to increasing demand.

Higher bandwidth will be driven by applications. As applications like imaging, music, live video, telemedicine etc gain acceptance the demand for capacity would grow exponentially.

It is easier for the government to further explore wireless options to increase the coverage and availability of broadband networks. One option is to release spectrum in other alternative bands with negligible usage

today like the 700 Mhz band and offer it for wireless broadband. This will ensure more robust networks rolled out on already existing infrastructure of towers to bring the true feel of high end broadband.

So while there is need to leverage on the existing networks – both wireless (which is more widespread) and wireline to provide basic access quickly, we should plan to enhance capacity and bandwidth over the next few years through clearly planned allocation of high bandwidth spectrum.

Question 7: What network topology do you perceive to support high speed broadband using evolving wireless technologies? (Reference Para 3.22)

Network topologies will be dictated by technology. Topologies – whether physical or logical – are simply designs and the network architecture is dictated by objectives for which the network is created – for example is the network being designed for a very small number of high end users or is it for a large number of low end users or alternatively whether the network is for data hungry applications or simply for voice applications.

However, the network topology is an aspect that cannot and must not be dictated by regulatory intervention.

The Indian telecom environment is driven by a completely technology neutral licensing regime which allows deployment of all kinds of technology. Availability of spectrum is the only limitation. The licensor and policy maker allocate spectrum from time to time based on various criteria, like new licenses or auctions.

Network topology is also dependent on whether the network is a wireline or a wireless one. Our current networks are a combination of both and operators take a business call on how much of each to deploy. No one topology can be the best.

It is thus important that issues of topology should not be discussed in this paper because that would involve a detailed examination of existing and possible future technologies and their capabilities. And no one solution can be the only workable one.

Question 8: What actions are required to ensure optimal utilization of existing copper network used to provide wireline telephone connections? (Reference Para 3.22)

There are many factors here that would require to be focused on. For example the wired copper networks in urban areas are substantially better in quality than those in rural and remote areas.

As has been noted by the Authority in its consultation paper, over 60% of broadband users belong to the top ten metros and tier-I cities, And even in metros barely 30% of the broadband connections are on wireline networks.

As such, it is probably not about optimal utilization of existing copper networks but a combination of the following that is restricting spread of broadband on wireline:

- Poor quality – the network itself is of a standard that requires upgradation for any significant utilization and this involves that may not seem justifiable due to the demand;
- Usage need of customers – it is possible that the utility of the mobile is so high that more people would prefer availing broadband on their handsets than on the copper networks. In fact access on copper is location dependent, is fixed and has specific end equipment requirements.

Mobility delivers freedom from location and allows more productive use of time and capability for all types of users, including professionals, traders, farmers, business persons on the move – such people are constantly on the move within or outside the village, town or city and also require information and capabilities that the broadband network delivers.

The Consultation paper notes that there will be nearly 2 billion wireless broadband connections by 2013. And market estimates peg it at 3 billion by 2015.

Of course the wired networks of today that are of sub-optimal quality should be simultaneously upgraded and opened up for access to third party application service providers who in turn will drive innovation and adoption.

By improving the quality of the existing wireline infrastructure it will also be possible to increase the number of public fixed broadband access points in the country (like post offices cyber cafes and kiosks).

Question 9: 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? (Reference Para 3.22)

Fiber in the access network has been globally experimented with and observed to be a highly expensive, long term and perhaps unsustainable investment – even in countries with much smaller geography, more concentrated population, and higher spending power – such as Germany and the UK. It could also be a little overhyped.

The kind of applications and user requirements that will justify fiber in the last mile – spread across the length and breadth of the country – are not available today and may take a long time to be in demand. Fiber is capable of supporting extremely huge bandwidths and users do not require such huge capacities today. We firmly believe that today the basic needs would be more than taken care of with simply 256 kbps connectivity – and this will be a catalyst for bigger growth.

The option to transform the basic access to extremely high end fiber access should definitely be encouraged as a long term objective but left to market forces – because it will find its own levels.

In fact the need is to quickly capitablise on the wireless eco system which is already well developed across the world and growing. A quick snapshot of developments in the mobile broadband world – from the high end technologies being adopted to the markets being created show a lot of development:

- 325 WCDMA networks commercially launched in 135 countries
- 315 commercial HSPA based networks in 133 countries
- 80 HSPA+ network commitments, 41 systems launched
- Blazing speeds of up to 42 Mbps to be possible by the end of 2010
- LTE brings the opportunity for additional spectrum, initially in the Digital Dividend bands (700 MHz, 800 MHz) and additionally 2.6 GHz in many regions.
- 19 LTE networks are expected to be in commercial service by end 2010, including in markets which are key drivers of global scale and innovation and therefore lower cost services – the USA and China in particular.

Finally, in a country like India, the concentration of demand for high end bandwidth that would justify the cost of rolling out fiber across vast expanses is extremely limited. Wireless coverage, with its associated network economics would be the best method.

Question 10: What changes do you perceive in existing licensing and regulatory framework to encourage Cable TV operators to upgrade their networks to provide broadband? (Reference Para 3.22)

The licensing framework in our country is fairly well defined for different categories of services. Any entity wishing to provide the services allowed under any category of license is free to apply for that. Spectrum is the only limited resource.

Cable TV operations continue to remain largely a localized activity in our country. One of the means to bring about better broadband connectivity over cable TV would be to encourage investments to replace existing coaxial and older technology networks with more robust infrastructure.

But any increase of scope of the cable TV licenses should clearly ensure level playing field for all existing stakeholders. Some other methods to be adopted would be to bring about greater transparency through limited term tax benefits.

Further, a national infrastructure policy covering both wireless networks (towers) and wireline networks (like fixed line and cable network) would go a long way in bringing certainty and clarity.

Question 11: 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? (Reference Para 3.39)

The Authority has noted that there is nearly 750,000 route kms of fiber available in the country. It is possible that this number would be closer to 1 million route kms if combined with smaller, disaggregated networks, captive networks of fiber spread over remote areas, which can be shared for backhaul.

However, there are alternatives where none existed some time ago. For example, in January 2008, the TRAI itself had noted in its recommendations on growth of broadband the possibility of using *wireless for back haul, and also the possibility of utilising the USO fund to subsidise backhaul charges including International Internet Bandwidth for a period of 3 years to support the rollout efforts of broadband service.*

It is thus submitted that though backhaul is always an important factor for broadband access – the availability of fiber on all routes may not be an imperative. For the more remote areas where even basic Internet access is lacking, even low bandwidth backhaul on microwave or other technologies could be contemplated. And this would be adequate to cater to the initial data demands of first time users.

The government itself has already stated its intent to connect 250,000 gram panchayats in the country with high speed broadband networks. The option of providing such connectivity on fiber backhaul is a long term and cost intensive one, which needs to be implemented in a phased manner but should not delay the exploration of existing, on the ground alternatives.

One way to do this would be to leverage on the accumulated reserves in the USO fund which are vast and currently lying unused. This has also been noted by the Authority in its consultation paper.

We would request the Authority to consider recommending formulation of USO schemes which ensure that these reserves can be deployed to support efficient backhaul and local access deployment, especially in rural areas, would have a substantial positive influence on broadband rollout.

Question 12: If so, is there a need to create national optical fibre network extending up to villages? (Reference Para 3.39)

We strongly believe this is not an imperative at this juncture. For all the various reasons mentioned earlier, wireless is the best option for connectivity today.

Running fixed line networks can be prohibitively expensive, particularly in rural areas, where the network utilization factor and cost justification are unlikely to match. It is advisable to adopt a practical approach, at least in the near term.

Mobile technologies today permit high throughput, spectrum efficiency, and are based on IP architecture. These factors combined make mobile/wireless the ideal option for deploying broadband services, particularly in undeveloped and far flung regions.

Fiber would ultimately be the core backbone to support high end broadband connectivity. We need to strike a balance between access/coverage and speed.

The expenditure involved in deploying broadband networks is significant and therefore it may make sense to have a sensible balance between providing coverage / access to as large a segment of the population as possible and developing network capabilities like speed over time.

A significant part of broadband coverage can be achieved through wireless networks and suitable incentives to existing UASL operators to achieve connectivity, at least in the immediate future – which can be expanded / upgraded to higher end technologies in a phased manner.

Question 13: 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? (Reference Para 3.39)

The process of creating a fiber network is continuous. The UASL, NLDO, ILDO and cable operators are already in the process of building their networks. A lot of fiber has already been laid under the ground. And more is being added month after month.

The early mobile networks in cities and metros are now expanding towards suburban and rural areas – where the untapped markets lie. Along with the wireless infrastructure, these locations will also require to be connected on a robust backhaul and operators building this capability in order to serve these markets.

Harnessing all these independent efforts to a common pool and going forward in a manner that avoids duplication, would be a much better option than creating a new agency, which will be fraught with the problems of coordination, structure and execution.

Benefits of schemes can be extended to all those who are creating the infrastructure in any case. Further we would like to submit that there is need to further build upon the DoT Committee Report on Rural Telephony. The Authority's recommendations on rural telephony have already been considered by a Committee set up in DoT under the chairmanship of Joint Secretary (T). The Committee has submitted a report with a number of forward looking proposal for delivering broadband connectivity to rural India, which includes:

- Special subsidy schemes for wireless broadband
- Fiber back haul and use of alternate energy sources
- Applications and services
- Incentives to operators for quick roll out
- Subsidize microwave/wireless/VSAT based backhaul wherever feasible, for effective and quick roll out of services.
- Area specific local content to address the local and immediate needs of the people
- Devise schemes for rural broadband connections in government run schools, primary health centers etc.
- A National Telecom Infrastructure Policy to speed up deployment of infrastructure in rural areas by laying down guidelines for RoW, land acquisition, availability of power supply etc. desirable to

make this policy into “National Telecom Infrastructure Act” or appropriate changes in Indian Telegraph Act which will be binding on state governments.

- USO should devise scheme to provide subsidy to service providers who deploy alternate energy sources in rural network

Question 14: 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? (Reference Para 3.39)

The exercise of creating a separate national fiber agency is fraught with too many invariables and duplications.

There are many agencies, operators and infrastructure providers who already have fiber in the ground and continue to extend this to larger and larger regions in the country. It would be more practical, faster and less expensive to create a framework for synergy between these agencies to extend fiber coverage over the uncovered regions. The total time and cost involved would be defrayed over multiple agencies and would be far more sustainable.

Question 15: What precautions should be taken while planning and executing such optical fibre network extending up to villages so that such networks can be used as national resource in future? What is suitable time frame to rollout such project? (Reference Para 3.39)

There is a need to first clearly assess and take stock of the prevailing availability of fiber networks in the country before even considering a project of such mammoth proportions. We strongly believe there may be no need, if the existing infrastructure itself is properly utilized, for the possibility of extracting capacity is almost limitless from fiber.

It is also respectfully submitted that taking stock would provide a very clear picture of the real need for this kind of exercise and indicate the routes where such capacity building is necessary, if at all. And we would be in a much better position to plan for the future.

Question 16: Is there a need to define fixed and mobile broadband separately? If yes, what should be important considerations for finalizing new definitions? (Reference Para 4.18)

From a quality and reliability perspective it is possible that the two forms would require differential treatment and definitions. However, from purely the end user perspective the basic broadband speeds can be fixed at the bare minimum defined today. It is adequate and capable of being achieved over both types of networks.

However, the choice of delivering higher capacity, more bandwidth and offering better grades of service should be left to market forces and the operators.

Question 17: Is present broadband definition too conservative to support bandwidth intensive applications? If so, what should be the minimum speed of broadband connection? (Reference Para 4.18)

The definition of broadband completely depends on the objective. If, as in the Indian context, it is ubiquitous coverage and widespread availability of basic broadband coverage then the existing definitions are adequate and the thresholds can even be lowered a little. There are large expanses of the country where even 144 kbps of continuous, seamless data connectivity is not available. Delivery of this minimum ability should be the core policy driver for broadband.

However, having achieved this objective, it is desirable to then raise the threshold as is being done in some countries to higher bandwidth delivery capabilities. We would suggest the following hierarchy for consideration:

Standard broadband capable of achieving access speeds of up between 256 kbps to 1 Mbps both in the wireless (e.g. 3G, 4G, LTE, Wimax etc) and wireline technologies like asymmetric digital subscriber line (ADSL).

Fast broadband capable of higher download speeds of up to greater than 1 Mbps and upto 20 Mbps download speeds and up to 10Mbps of upload speeds. Key technologies that will drive this will be a combination of copper and fiber. In this, fibre to the cabinet (FTTC) connect the street cabinets located within a few hundred metres of the customer premises. Households are then connected from the cabinet by copper lines. Cable networks often have a similar architecture, with fibre to the cabinet and coax cable from there to the home. FTTC and cable speeds are higher than ADSL, but are often not fully symmetric and are determined, in part, by a household's distance from the cabinet.

Superfast broadband connections can then be targeted to be rolled out over the next five to ten years to be progressively achieved starting with the top cities and progressing to the distant and remote areas of the country. Here the upload and download speed would be upwards of 20 Mbps.

Technologies that would deliver this would include LTE and other wireless technologies as well as fibre to the home (FTTH) and fibre to the building (FTTB), which involve laying fibre-optic cables directly to the customer premises, either through a gigabit passive optical network (GPON) or point-to-point fibre (PTP).

FTTH and FTTB connections typically allow the highest speeds, lowest latency, greatest reliability and truly symmetric connections when contrasted against FTTC and ADSL. This is the final frontier of broadband.

Question 18: What specific steps do you feel will ease grant of speedy ROW permission and ensure availability of ROW at affordable cost? (Reference Para 4.30)

ROW permissions in cities and towns should be mandatory – either individually for operators or shared between multiple utilities – within localities, buildings and group housing facilities. Denial and delay of permission should not be permitted.

A reasonable cost for covering liabilities and administrative needs should be allowed but again this should be affordable and have a methodology for calculation.

In the medium term, it is important to include broadband services under an overarching infrastructure policy framework that will accord priority to broadband projects for ROW permissions with a defined and objective pricing mechanism thereby eliminating arbitrary, highly priced ROW rates.

We also request that the TRAI may consider recommending the creation of a National Telecom Infrastructure Policy to speed up deployment of infrastructure in rural areas by laying down guidelines for RoW, land acquisition, availability of power supply etc. desirable to make this policy into “National Telecom Infrastructure Act” or appropriate changes in Indian Telegraph Act which will be binding on state governments.

Question 19: Does the broadband sector lack competition? If so, how can competition be enhanced in broadband sector? (Reference Para 4.42)

The Authority in its consultation paper has noted that there are 104 service providers providing broadband services! This is a very high number of service providers competing within limited geographies.

The comparative number of mobile service providers with 12-13 operators in each circle is far lower and yet the bruising effects of that in terms of low business value and returns is obvious. Even this level of competition is unprecedented internationally – there is no country of which Vodafone is aware in which more than 2 fixed/cable operators and more than 3-4 mobile operators have managed to build a sustainable market position. It is thus essential to follow a calibrated policy of ensuring enough competition but not excessive competition. This is absolutely vital to ensure that service providers are encouraged to invest in good quality and high end technologies even if the gestation and pay back is long.

Low quality is a result of the lack of such incentives.

Thus we feel that competition in the broadband space is more than adequate, but there is need to structure it and provide it a framework for encouraging investments.

Question 20: 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? (Reference Para 4.42)

Usage charges today are as competitive as ever and the trend is increasingly reflecting that of voice – slow increase in usage, driven by lower prices and simpler constructs of data use.

Data is the new frontier for the telecom industry as a whole and broadband is the new highway. Mobile data (SMS and value added services like GPRS access, content download, premium services like gaming etc) comprise barely 8 -10 % of operators' revenues currently.

The global mobile data usage on the other hand surpassed that of voice in 2009. In fact voice is just becoming another form of data with IP networks and multimedia packages transforming telecoms into an increasingly data centric world.

Research on the state of data and broadband markets globally shows that the 400 odd million mobile data users generated some 140,000 terabytes of data per month in 2009. This is estimated to reach 3.6 million terabytes of global mobile data per month by 2014 – according to estimates made by various vendors and service providers in the space.

Even as this trend of increasing use gathers momentum revenues are falling (Mobile Broadband status report (www.gsacom.com)).

This trend is reflected in India – though on a smaller base but is picking up. One reason for this is that mobile operators are offering data services at flat unlimited packages. Even the pay as you use plans with per download (per kilobyte or per megabyte) prices have seen huge reductions over the last one year.

There is a logic for this. More applications are now available for users and affordable rates will mean greater use. Larger data volumes will drive prices down further. Voice may eventually get subsumed into data: a mobile voice call typically consumes 6-12 kbps of bandwidth whereas enhanced mobile internet usage would consume much higher bandwidths. A 5 Mb PowerPoint file or a ring tone consumes as much data on the downlink as speaking on a phone for over an hour.

The wireline segment too has many unlimited data packages and the rates are extremely low when compared to data rates anywhere else in the world.

Thus, the pricing of data services and broadband packages is hardly a cause for the low uptake. The factors, as argued earlier are a combination of availability of the basic network coverage, applications that enhance productivity or drive usage and the perceived value out of using them.

Question 21: Do you think simple and flat monthly broadband tariff plans will enhance broadband acceptability and usage? (Reference Para 4.42)

Simple and flat data tariff plans are already the norm in the market today. In fact, with increasing sophistication of users, higher demand for data and adoption of the Internet for daily information the per-kilobyte rates on both fixed and mobile broadband have drastically reduced.

Given their different cost structures mobile operators are offering substantially lower prices to subscribers for even low volume broadband Internet use.

The TRAI in its study paper on Internet and Broadband Tariffs in November 2006 derived the effective tariff for Internet access. It considered the fixed and variable charges payable – excluding service tax.

Internet access tariffs in cyber cafés was estimated to be between Rs. 5 to Rs. 15 for an hour (Rs. 10 being the most common). It had also estimated that the minimum monthly outgo for a broadband subscriber was Rs. 199 in Delhi & Mumbai and Rs. 250 in rest of India. This is fairly low and has gone further down over the years.

Broadband tariff plans can be divided into two broad categories of limited usage and unlimited usage.

The limited usage plans are volume based plans. Under these plans, subscribers get Internet access with specified free data transfer (in MBs) for a fixed monthly charge. Any additional usage is charged separately. The effective charge per megabyte - estimated by TRAI based on actual usage of 500 MB of per month – was Rs.0.60 to Rs 0.75 per Mb.

Wireless service providers today offer data plans at substantially lower rates for unlimited use of Internet. File downloads (like a song) and game downloads (with video) etc may be charged separately, because they fall in a category different from the daily requirements of broadband access that we are debating here.

The mass adoption of broadband that we seek to encourage through this paper will comprise of basic capabilities of accessing the Internet and information sources that enhance productivity and commerce.

The per MB download rates on mobile are low and there are unlimited packages per month also available. The charges in this category of plans are not dependent on the quantum of data transfer/Internet access.

Since there is always scope for enabling greater affordability, government should design a universal broadband policy that provides some minimum subsidy to operators for allowing non-users to latch onto and start using broadband facilities.

One possible way would be to leverage the most common Internet access point in our country: the community Internet or cyber café. To make available broadband to a larger section of people at very affordable prices the government can play a role in subsidizing access.

Question 22: Should broadband tariff be regulated in view of low competition in this sector as present? (Reference Para 4.42)

We are not sure how a conclusion could be reached that the level of competition in broadband in India is low – as the Authority has noted, there are over 100 broadband providers. There are 12+ mobile operators

providing GPRS/EDGE, CDMA EVDO and W-CDMA 3G services. BWA operators are about to enter the market as well as 3 additional 3G operators from September. This is a level of competition which is far higher than any other market of which Vodafone is aware.

The TRAI has developed a fairly sophisticated framework for telecom tariff regulation over the years. This covers mobile, fixed and broadband networks as a whole. This framework has now been extended to cover the broadcast and satellite segments too.

There have been many iterations, modifications and changes to its telecom tariff regulations to keep pace with the changing needs of customers and technologies.

It is a fairly evolved tariff framework that caters to both the wireline and wireless segments. The TRAI has also laid down very specific guidelines for value added services and pricing of content etc.

Further, the sector itself has enough players and competition is not a limiting factor.

It is just the enabling framework for incentivizing large scale network deployment together with suitable applications and services that have been an inhibiting factor.

We therefore believe that the present structure for tariff regulation should continue to govern the sector. And there is no need for additional regulations.

Question 23: What should be the basis for calculation of tariff for broadband, if it is to be regulated? (Reference Para 4.42)

Tariff for broadband services are already being determined by market forces and are competitive enough for subscribers. As the broadband networks spread to more distant and remote areas, the competitive pricing regime will also follow.

It is best that the tariffs continue to be left to market forces, in fact there is need for the regulator to do away with a host of their existing telecom tariff orders that serve today to reduce the choices for customers.

We are not aware of any regulator which has sought to regulate broadband retail tariffs.

Question 24: How can utilization of International Internet bandwidth be made more efficient in present situation? (Reference Para 4.42)

There is an urgent need to make the functioning of the national internet exchange – NIXI - more meaningful – both in delivering domestic peering and international bandwidth.

Concurrently, domestic content needs to be boosted – thereby reducing dependency on International Internet requirement. For this, local content caching should be introduced at storage facilities that are developed or encouraged to improve utilization of Internet BW. This can be done by a separate emphasis on CDN (content delivery networks) deployments.

Question 25: 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. (Reference Para 4.42)

The use of domestic and international internet bandwidth can be segregated based on network prefixes. The major cost of delivering Internet today is linked to the high International bandwidth prices. Nearly 70% of the cost for delivering broadband connectivity and Internet access is due to the high cost of International bandwidth.

Question 26: What steps should be taken to bring down the cost of international internet bandwidth in India?(Reference Para 4.48)

The TRAI has noted in its consultation paper that it had issued regulations to facilitate access to essential facilities like cable landing stations to enhance competition and reduce international bandwidth charges. This was an outcome of the prolonged impasse in the sector between those who controlled this bottleneck facility and those who didn't but desperately required the access. In contrast to the access networks where dozens of operators compete vigorously, the CLS market is effectively in the hands of 3 operators – a level of competition which is far lower and deserves serious regulatory consideration.

It is unfortunate that the situation has not improved much despite this regulation of the TRAI. In fact there is a serious need to either deregulate and unbundle the access to these facilities or to encourage investments in and creation of more Submarine Cable systems by all operators thereby reducing dependency on bottlenecks controlled by a few.

It is vital that TRAI should initiate steps to set some benchmarks of transparency for pricing and access to CLS. In the absence of a well defined methodology to fix charges for accessing CLS, there is a lot of scope for restrictive practices and this is a huge and serious problem for the industry as a whole.

Though TRAI had issued a regulation for facilitating access to essential facilities at CLS and enhance competition this has not translated to anything specific on the ground as it did not prescribe any charges for accessing CLS.

By simply mandating non- discriminatory access by ILDOs to the CLS, the field is open for owners of the facility to levy exorbitant charges not in any way reasonable or reflective of costs. This today is a serious bottleneck in the International bandwidth sector causing operators to bear artificially hiked international bandwidth charges.

Question 27: How can competition be enhanced in the International bandwidth sector? (Reference Para 4.48)

We believe that it is essential to encourage more cable landing stations on Indian shores and open up competition to a wider field of suppliers. For example, there is room for a regional Cable landing Hub for Asia Pacific. It is also essential for some regulatory intervention here, to reduce the arbitrary RIO access charges of Cable Landing Stations (CLS) for international capacity on Cable Systems.

Currently, nearly all capacities on CLS in India are controlled by three entities. As a result their charges are arbitrary and very high and far in excess of the cost of the international capacity itself.

For example, the international bandwidth prices for capacity from Mumbai to London is less than the charges that have to be paid to the CLS for access. This disproportionately inflates the pricing for international bandwidth for those who require international bandwidth – like the ITES sector. Prices of International bandwidth can be considerably brought down by regulating the RIO charges or increasing competition.

High and inflexible, input prices on account of this reduces our price competitiveness in the market. This is also an impediment to the growth of broadband in India. We would request the TRAI to develop some benchmarks based on international practices for charges to access cable landing stations.

Question 28: 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? (Reference Para 4.59)

The TRAI can consider defining an unambiguous set of standards in the form of a regulation or recommendation. Subsequently, this should be left to market dynamics for implementation with periodic reviews and audits to ensure compliance.

Question 29: 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. (Reference Para 4.59)

There are lessons to be drawn from the mobile sector for the broadband sector too. There are nearly 104 broadband service providers in the market. And yet the net broadband additions per month are barely 100,000 to 200,000. Broadband penetration is just 0.74% when compared with the teledensity of 52.74% - driven primarily by the presence of some 12-13 mobile operators in each circle.

However, if the effective additions of mobile customers every month is observed, it is the first five players who are adding more than 90% of the customers, and are adding virtually all additional customers in rural areas.

It is not the presence of more players that will drive adoption, but the availability of high quality, stable and robust services that will see greater use. This can be achieved by ensuring adequate space and return on investments for those who are willing to sink in big money to build latest state of the art wireless or wireline networks. Presence of too many players ensures a very rough and bruising tariff war without delivering adequate quality to customers.

So there is in effect there is a virtuous circle: availability of good broadband networks drive the delivery of high end bandwidth hungry applications. And the incentive for developing good applications arise only when there is a decent infrastructure to deliver them.

Some of the best online and mobile applications like games for example are being developed by Indian firms but these are not available to Indian users on account of the lack of enough bandwidth and infrastructure. They are extremely popular in other markets like Japan and the US.

Thus it is essential to strike a balance between good networks, enough incentives for ROI for those building high end networks and a fertile ground for breeding good applications that will attract more users and subscribers.

Question 30: 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? (Reference Para 4.59)

The TRAI has already defined a set of QOS parameters for the broadband industry. Since telecom is an evolving sector driven by innovation and constant change, these parameters can be regularly monitored and reviewed.

Question 31: What measures do you propose to make Customer Premises Equipment affordable for common masses? Elaborate your reply giving various options. (Reference Para 4.64)

Widespread availability of broadband networks, digital content in local languages and an affordable means to access the content on the network are the three pillars that will drive adoption of broadband / Internet use in our country.

Traditionally, the PC, laptop and cable enabled devices have been the main sources of accessing the Internet. However this is rapidly moving to mobile devices with enormous processing power and delivering data on the move. It has opened up rich new capabilities and possibilities. It is also extremely attractive to users as a tool of productivity.

In the past, the high cost of Personal Computers was a big reason for slow Internet penetration in households apart from poor telecom and internet infrastructure. This has also been a reason for the popularity of the cyber cafes.

While the need to provide fiscal and tax incentives to make them available at affordable rates has been emphasized before, there is now need to find other innovative ways to subsidize access devices like these for broadband use. This could include initiatives like widescale deployment of computers at all primary schools and local libraries with support from government subsidies.

However, the increasing use of smart phones and mobile data devices has thrown up new possibilities. There is an increase in the type and variety of mobile broadband-enabled consumer products like e-book readers, mobile digital cameras, camcorders, personal media players, personal navigation devices and mobile gaming devices.

According to Internet and Telecom research firms it is estimated that by 2020, mobile devices will be the primary means to access the Internet for most people in the world. The uptake of smart mobile devices is still slow in India. Price has been the primary inhibiting factor. But it is well known that since the launch of devices like iPhone and iPad the take-up of mobile internet by subscribers has far exceeded the equivalent adoption rate of the fixed internet on the desktop.

We need to find ways to replicate this here and finding means to bring down the prices of such devices should be priority. Encouraging local manufacturing would be one way. Tax benefits for providing stripped down versions of fully loaded handsets to OEMs who already have manufacturing facilities in the country could be another way.

The government needs to make massive efforts to e-enable all its applications for the mobile environment. So all the frequently used e-government services can start working effectively on mobile devices in future. Many of today's non-Internet users may not use PCs for online access in future.

Then there should be fiscal incentives to service providers to bundle their broadband services together with devices like eBooks or smartphones. There should be an enabling framework for service providers to do this and thus fuel growth of mobile Internet use.

With applications like e-health a new class of low power / no-power hand-held or other and medical devices, including implantable wireless monitors and related medical accessories could be an area requiring support and to ensure their clinical use over the networks.

Question 32: What measures are required to encourage development of content in Indian vernacular languages? (Reference Para 4.68)

Once again there is need for a lot of government involvement at various levels to drive the creation of local and regional content that are useful. The recent adoption of Indian languages in the 3GPP standards for enabling SMS in Indian languages is one such initiative.

There is need for more such initiatives and for the government to work with the telecom and IT industry together.

We need to learn from the experiences of countries like Japan, China, Thailand, wherein governments have helped develop and adopt standards, enforced these standards. As a result the use and utility of IT has percolated to the masses much faster in these countries.

It is thus, necessary to involve all other stake holders like software developers, standards bodies like TEC and Department of Science and Technology to help rapidly develop standards and drive localization to ensure technology proliferation at the base of the pyramid. This will boost broadband uptake.

We need to make efforts to reduce language based digital divide. The language gap must be plugged for effective e-initiatives. All Indian scripts should be supported by IT and mobile vendors, driven by regulatory requirement.

Question 33: Do you perceive need for any regulatory or licensing change to boost broadband penetration? (Reference Para 4.71)

This has been listed out in detail in our submissions above.

To summarise, support from the USO fund, encouragement for adoption of wireless broadband, initiatives to e-enable government applications, incentives to allow bundling of end devices with broadband connections, tax holiday for providing connectivity in rural and remote areas and a massive effort to bring local and regional content are some of the main policy and regulatory enablers required.

The broadband policy should not be separate from broader regulatory and policy initiatives as each and every element of the policy and regulatory regime can either encourage or discourage investment especially in marginal rural areas.

We urge the Authority therefore to review broader fundamental regulatory and policy initiatives to ascertain how they are helping broadband penetration and uptake and how best to improve on it further. In particular:

- Substantial amounts of spectrum are needed to deploy wireless broadband services and Indian spectrum allocations are probably the smallest in the world – with average international allocations of 22MHz for 900/1800 spectrum compared to ~6MHz in India, and allocations of only 5MHz of 2100 Spectrum compared to an average of 15-20MHz internationally.
- Putting in place spectrum policies and regulations which encourage rather than discourage scale should be a fundamental priority. Ensuring early auction of the majority of the 700MHz band should be seen as a national priority (which would also raise additional revenues for the exchequer).
- Deployment of new national fixed networks are simply not a priority. PSUs and private operators have deployed extensive multiple transmission, backhaul and local access networks. Efforts should be focused on encouraging the extension of those networks rather than wasteful duplication of infrastructure, especially if such infrastructure pre-supposes, contrary to the

technologically neutral fundamentals of the Indian policy and regulatory framework, that local access should be fixed rather than wireless.

Question 34: Are there any specific competition and market related issues that are hindering growth of broadband? (Reference Para 4.71)

There are some important issues that may require attention to make broadband deployment a real success especially in rural areas:

- Availability of uninterrupted power supply is crucial for providing quality service
- Power supply to mobile and broadband services should be accorded 'priority feeders' for electricity supply.
- Special support from either USO or the broadband fund for power supply to BTS's and BSC's for roll out of mobile broadband is essential
- We would also request that subsidies should also cover use of non conventional energy sources such as solar power, bio-fuels, wind power, etc.

We would request the government to consider the creation of a National Broadband Fund to specifically meet the national broadband objectives of the Government. Some percentage of proceeds from the recent 3G and BWA spectrum auctions can be deposited in this fund.

Question 35: What other fiscal/non-fiscal measures should be considered to boost broadband penetration? (Reference Para 4.71)

We would submit the following for consideration to incentivize Broadband roll out further in the sector.

- Allow the amount paid for acquisition of 3G and other spectrum for delivery of broadband through auctions to be treated as a capital asset
- Permit this to be amortizable for tax computation purposes during the tenure for spectrum usage rights
- Companies providing Internet and broadband connectivity be exempt from income tax for ten years under section 35 (A) of Income Tax Act.
- Lowering of customs duty on broadband network deployment products & user devices.