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**DUA**  
Consulting

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Chairman  
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Mahanagar Doorsanchar Bhavan  
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**Sub: Comments for consideration of TRAI on National Broadband Plan.**

Dear Sir,

Please see enclosed a copy of our comments on the various issues mentioned in the consultation paper on "National Broadband Plan".

We firmly believe that connectivity is not the only factor affecting broadband penetration. Other factors that equally impact penetration are tariff, terminating equipment, local content, etc. By making broadband accessible on a variety of devices such as TV sets, projectors, mobile phones or any other handheld/compatible device apart from conventional computer/laptop, will have far reaching effects in addressing penetration issues and increasing perceived utility of the technology.

While deciding upon Access Network, we must keep in mind the vastness and inaccessibility of many parts of the country. Multi pronged approach is the real solution; "...either this or that..." approach is not valid keeping in mind India's demographic and geographic diversity and needs. Similarly funding must come from diverse sources. Though Government's role is pivotal, private sector participation both in mass and niche markets is essential to achieve success.

Using optical fibre as access technology in rural and remote areas having lesser bandwidth requirements is gross wastage of time and money resources. Rather, satellite, wireless and cable/DTH technologies should be utilized to quickly link and establish such areas on national network. Innovative thinking is required to quickly scale and establish connectivity in vast rural areas. One such way is to string back haul optical fibre cable over transmission towers. This will also help reduce costs as digging/piping need not to be undertaken.

Finally we would like to mention that taking into account spectrum value as determined by recent spectrum auction, per subscriber monthly cost of usage of spectrum comes to the tune of Rs. 150-200 only. It is not as high as recently quoted by many operators. It must be ensured that operators do not make windfall gains at the cost of subscribers and in the name of spectrum auction. All necessary measure should be taken to protect the interest of subscribers.

We request the authority to take our views into consideration while formulating their recommendations to the Government.

Yours Sincerely,



**Ravi Oberoi**  
**Senior Principal**

Encl: as above

Cc: Sh. S. K. Gupta, Advisor (CN), TRAI

*Inputs by Mr. BK Syngal, Senior Principal, Dua Consulting and former CMD, VSNL*

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## **Consultation Paper on National Broadband Plan**

### **Summary**

The TRAI Consultation Paper on **National Broadband Plan** has sought stakeholder and industry comments to evolve a National Broadband Plan, covering various aspects ranging from the definition of broadband to spread of infrastructure and various regulatory and other related issues. The concerned issues are that of

- Present Status of Broadband in India
- National Broadband network
- Regulatory Challenges

### **Broadband Scenario in India**

Broadband in telecommunications refers to a signaling method that includes or handles a relatively wide range (or band) of frequencies, which may be divided into channels or frequency bins.

As per International Telecommunication Union (ITU), usually broadband is associated with a particular speed of transmission or a certain set of services, such as digital subscriber loop (DSL) or wireless local area networks (wLANs). However, since broadband technologies are always changing, the definition of broadband also continues to evolve. Today, the term broadband typically describes recent Internet connections that range from 5 times to 2000 times faster than earlier Internet dial-up technologies. However, the term broadband does not refer to either a certain speed or a specific service. Broadband combines connection capacity (bandwidth) and speed. ITU Standardization Sector defines broadband as a "transmission capacity that is faster than primary rate Integrated Services Digital Network (ISDN) at 1.5 or 2.0 Megabits per second (Mbps)".

We are of the view that the regulator for all future purposes may consider data speed of 2Mbps or above as Broadband speed for India.

Moreover, in the age of convergence, any rigid definition based on specific speeds/bandwidth is not very relevant. Service providers should be allowed provide speeds/bandwidth above a certain threshold speed that the technology they adopt permits.

In the consultation paper on National Broadband Plan, regulator refers to The Broadband Policy, 2004, which had set an ambitious objective of 20 million broadband subscribers by 2010. The consultation paper also points at the huge gap between objective and reality, with only 8.75 million broadband connections at the end of March 2010<sup>1</sup>. Regulator has cited lack of core infrastructure as the primary impediment in way of achieving this objective. However, regulator should not ignore the fact that like any other commodities, pricing plays a vital role in both

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<sup>1</sup> As per TRAI consultation paper – Introduction (iv).

consumer and business decisions to adopt broadband. A higher broadband penetration is also dependent on low pricing of service. This can be achieved by increased competition and innovative pricing schemes that will attract wide variety of customers. Indian mobile revolution is a typical example that highlights how competitive pricing made suitable business case for all strata of society to adopt mobile telephony with open arms.

We are also of the view that connectivity is not the only factor affecting broadband penetration. Regulator must also look at ways to counter other factors impacting penetration such as tariff, terminating equipment, local content, etc. By making broadband accessible on a variety of devices such as TV sets, projectors, mobile phones or any other handheld/compatible device apart from conventional computer/laptop, will also have far reaching effects in addressing penetration issues and increasing perceived utility of the technology.

In our view, demand in urban centres will pick up as and when the services are available on competitive basis. In rural and remote areas the aim should be to make high speed internet connectivity available at reasonable rates quickly. By setting up internet kiosks in rural and remote areas, people at large can get a taste of the same. Broadband via satellite is the quickest option to start with. If mobile satellite service could introduce such facility, then even individuals can go in for their own connections.

### **National Broadband Network**

In the Consultation Paper, the regulator has divided broadband network architecture into two parts namely – Access Network and Core Network. Access Network provides last mile connectivity to subscriber's premise, while Core Network takes care of backend transmission/connectivity.

Regulator has named 5 technologies to enable Access Network, namely – DSL, Wireless, Cable TV, Satellite and Optical Fibre (OF).

A comparison of all such technologies demonstrates that though optical fibre provides highest speed and bits per second rate, it is an equally expensive medium of providing broadband access. Cost factor associated with optical fibre does not makes it a sensible option for last mile connectivity, except in case of enterprise or critical usage, while making an unviable business model for retail or small business consumers. Many learned people have come out in support of optical fibre for last mile connectivity giving examples of countries like Singapore. However, regulator must keep in mind that Singapore and India varies extensively on demographic parameters such as size, purchasing power, density, penetration and utilization factors, approachability, etc. Given the sheer size of India, we are of the view that it is not justified to compare apples and oranges. While deciding upon Access Network, we must keep in mind the vastness and inaccessibility of many parts of the country.

Next highest speed and bits per second rate is provided via DSL/Cable. This is presently the most preferred technology for providing broadband access. However, it does not support mobility.

As regulator has rightly mentioned in this Consultation Paper, rural penetration will form an integral part of achieving higher broadband penetration in India. We are of the view that for rural India, mobility would also be a critical factor while determining Broadband Access network. Whilst, higher subscriber density is an integral characteristic of urban penetration, mobility will be critical to rural penetration. Rural penetration can be characterized by lower subscriber density. For example, an urban subscriber may connect to broadband at home, office, café, or on the move; except for the last point at rest of the places mobility requirement of the subscriber can be fulfilled via wireless LAN technologies.

However, a rural subscriber, let's say a panchayat member may have to access some information (say, land records<sup>2</sup>) once at a village shop, next at panchayat office, then at some farm. Access network comprising of optical fibre or DSL/Cable does not make much sense in such case. However, wireless access technology makes much more sense.

To ensure a decent QoS and ease of usage, it makes more sense to provide satellite and wireless access technologies in rural and far-flung remote areas (wireless access can be easily provided by use of super efficient antenna systems with higher range than conventional antennas) and a mix of wireless/wired/ optical fibre technologies for higher density urban area. While recommending appropriate technology for Access Network, regulator must keep in mind that an arbitrary threshold of providing optical fibre to every village with 500 populations does not necessarily makes a viable business model; thereby adversely affecting ambitious broadband plans. A village with 500 people will have approximately 100 households. Even with an above average penetration of 20%, only 20 households will opt for broadband service. Laying optical fibre for such small load is gross wastage of time and money resources. Rather, we are of the view, that instead of taking optical fibre to every village and nook and corner, it should be terminated at some central and comparatively densely populated zone and then other access technologies be used to provide last mile connectivity.

Existing and widely spread copper network of state owned as well as private carriers can be utilized to provide last mile connectivity in towns where telephone exchange is situated. Regulator may also consider providing broadband connectivity to rural areas a part of rural roll-out obligation of service providers. A stringent implementation of the same is necessity of the hour.

With approximately 110 million households in India having cable connections, revamping of cable TV network alongwith DTH network can also act as a medium for broadband access to masses. Also, satellite connectivity can be considered for non-accessible rural and remote areas for providing broadband connectivity.

***At the end of the day, what has to be kept in mind is that cost of ownership forms an integral factor while deciding utility of any service/application.***

However, to ensure higher penetration, a strong backhaul of transmission network is basic necessity. We are of the view that optical fibre is the most appropriate technology and option for the same. Moreover, regulator must ensure that while laying optical fibre as backhaul, operator/agency must take into account future growth/demand and must lay wider cables in

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<sup>2</sup> For illustration purposes only

one go to support future demands. This will also ensure quick ramp-up in case of higher exponential demands (as expected by Regulator) and lesser subsequent ROW charges. A forward looking approach is required.

In this paper, Regulator has also weighed the option of forming a central agency to develop and operate such core network.

Instead of planning and laying optical network from scratch, regulator must undertake a pan-India exercise to map-up existing optical fibre network presently available with all the service providers' alongwith tube capacity. Subsequent to existing network (by various entities such as GAIL, RailTel, Airtel, Reliance, BSNL, etc), a more cost effective approach would be to augment existing tube capacity and extend its reach. Owner of the tube to be paid in a manner analogous to sharing of infrastructure for fixed line carriers. Such an approach would not only reduce the cost of laying basic network of optical fibre but also shorten the time taken to ramp-up existing infrastructure.

Given the vastness of the country and analysis of historic trend, we observe that Indian telecom sector took off only upon inclusion of private competition. We are of the view that symbiotic working by all players will be more conducive. Moreover, regulator has already permitted passive infrastructure sharing amongst operators. So, operators can easily share their core networks. As and when required, USO fund can also be utilized for this purpose. However, a central agency on line of Wireless Planning Commission should be formed which will take care of nitty-gritty of broadband planning in India. However, implementation and actual cabling of network could be left to service providers.

Questions have been raised on efficiency of market-driven approach for ramping up of broadband infrastructure in India. Regulator has also suggested that Government must take responsibility of putting in place basic infrastructure. Viability of Rs. 38,000 crore (approximately) worth spectrum auction for BWA spectrum has also been questioned. We are of the view that players are not emotional fools who will cling to spectrum if it does not make business sense. Recently service providers have cautioned that 3G services will not come cheap and its usage will set such subscribers back by Rs. 700-900 per month. We are of the view that such statements are only targeted at misleading the regulator. Project costs such as capex and opex are essentially business cases and decisions.

When subscribers were not burdened with network roll out costs for 2G networks, then why they must be unfairly charged for 3G/BWA services?? Since, this time operators have paid for market value of spectrum (which was freely handed out for 2G), at max they can charge subscribers to the tune of spectrum value. We are of the view that subscribers should not be unnecessarily charged for any cost other than spectrum cost, if at all !!

Industry has approximately paid Rs. 38,000 crore for BWA spectrum and total outflow has been close to Rs. 100,000 crore for 3G/BWA towards spectrum auction. This spectrum has been allotted to service providers for 20 years. Monthly cost of spectrum comes out to be as per the table below:

	<b>BWA spectrum</b>	<b>BWA/3G Spectrum</b>
Total Spectrum value as determined by auction (A)	Rs. 38,000 crore	Rs. 100,000 crore
Spectrum value on monthly basis (B) <sup>3</sup>	Rs. 158 crore per month	Rs. 416 crore per month

We will now carry out a back-of-envelope calculation to calculate monthly cost of spectrum for a subscriber using such services. As demonstrated above, monthly cost of spectrum comes to Rs. 158 crore for BWA spectrum and Rs. 416 crore for 3G/BWA spectrum. We have taken conservative round-off values for our set of calculations next.

Considering monthly cost of BWA spectrum to be Rs. 200 crore and Rs. 500 crore for 3g/BWA spectrum; monthly cost of spectrum for different subscribers comes out to be as follows:

	<b>BWA spectrum</b>	<b>3G/BWA spectrum</b>
<i>Total spectrum cost per month</i>	Rs. 200 crore	Rs. 500 crore
<i>Number of subscribers</i>		
(i) 10 million	Rs. 200/- per subscriber per month	Rs. 500/- per subscriber per month
(ii) 20 million	Rs. 100/- per subscriber per month	Rs. 250/- per subscriber per month
(iii) 50 million	Rs. 40/- per subscriber per month	Rs. 100/- per subscriber per month
(iv) 100 million	Rs. 20/- per subscriber per month	Rs. 50/- per subscriber per month

As demonstrated by table above, monthly cost of spectrum to be borne by each subscriber should lie within the range of Rs. 150 to Rs. 200 per month. Nowhere has it come closer to Rs. 700-900 as cited by operators. If such costs are levied by operators, they are only interested in making windfall gains in the name of spectrum auction and regulator must step-in to protect consumer interest.

### **Regulatory Challenges and Future Approach**

Time and again we have reinstated that moving forward; regulator must emphasize on making regulatory framework both technology and service independent. There is no need to segregate broadband connectivity on the basis of technology and medium adopted by the provider. Service providers must be permitted to provide a service via any technology

<sup>3</sup> B = A/(20\*12)

Moreover, a speed of 2Mbps is reasonable enough to be considered broadband speed and to support bandwidth intensive applications. Since, technology is evolving extremely fast, imposing any regulatory or licensing barriers is going to be counterproductive. It may thus be prudent to allow broadband service providers to offer unified services.

### Rural Connectivity

A key impediment to enhancing rural connectivity is the lack of backhaul. Erection of towers and BTSs can lead to creation of islands, without connectivity to other similar islands and the national grid. In this respect, our recommendation on the usage of VSats has been incorporated in TRAI's draft recommendations on the issue of rural connectivity. However, one may note that besides VSats, other innovative ways need to be evolved to address the issue of backhaul in rural areas.

It may be noted that issues like right of way in rural areas can be addressed via stringing backhaul or even last mile connectivity over power transmission lines. This can also be done in collaboration with the SEB's and other power entities such that the infrastructure gets shared with the SEBs leading to better utilisation of connectivity as well. Stringing of optical fibre cable over transmission towers can also help reduce costs as digging/piping may not need to be undertaken.

Government can consider an active and enabling policy framework, which encourages various Indian electric entities and those interested in telecom projects, to work closely in order to provide a booster to rural telephony. Achievement of rural backhaul can get a boost with this initiative, especially as transmission towers crisscross the length and breadth of the country, especially in rural and suburban regions. Certain SEBs have even evinced interest in offering their poles for stringing of fibre and sharing the created bandwidth. It may be noted that if this effort is extended nationwide, it could provide a fillip to rural telephony. Also, such innovative and out-of-box solutions can also help save a major portion of Rs. 32,295 crores<sup>4</sup> identified by regulator only for manual digging purpose.

Clearly the existing telecom infrastructure is inadequate even to meet the demands in urban centres. Implementation of optical fibre network will take time and enormous resources. Adequate use of satellite systems is a must if broadband or at least high speed internet penetration is to be increased in rural and remote areas cost effectively and in a reasonable time frame. Innovative satellite based solutions must be found. Ka-band satellites and Mobile satellite Services are two solutions that are readily available for implementation. Several satellite systems operating in Ku-band and capable of offering very high bandwidth are already in operation. Mobile Satellite Systems also offer fairly high data rate connectivity in mobile environment. For India recourse to satellite based solution is inevitable to cover rural/remote areas in a reasonable time frame.

### Funding of Rural Connectivity Initiatives

It may be noted that a perception exists that rural connectivity is not a viable business proposition as the areas may have sparse population density compared to urban areas.

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<sup>4</sup> Source: TRAI Consultation paper, para number 3.30

Moreover, internet usage in rural areas may suffer because of affordability issues and usage may remain low. In view of these issues, we are of the view that Government may consider utilizing USO fund for enhancement of backhaul capacity that can be strung on power transmission lines, which crisscross the length and breadth of the country, especially in rural India.

We are of the view that approach of "...either this or that..." is not valid for a country of India's demographic and geographic diversity and needs. This has been proven in the telephony and broadcasting areas over and over. Multi pronged approach is the real solution. Similarly funding must come from diverse sources. Though Government's role is pivotal, private sector participation both in mass markets and in niche markets is essential to achieve success.



## ISSUES FOR CONSULTATION

- 5.1 What should be done to increase broadband demand? (Reference Para 2.23)**
- 5.2 What, according to you, will improve the perceived utility of broadband among the masses? (Reference Para 2.23)**
- 5.3 What measures should be taken to enhance the availability of useful applications for broadband? (Reference Para 2.23)**

*(Combined response to 5.1, 5.2 and 5.3)*

Demand is directly proportional to perceived utility and utility is determined by applications supported/run on the technology. The regulator must not forget that demand factors are inter-related and not mutually exclusive. Another important factor that acts as a deciding point is pricing. If a service is appropriately priced, it is easily accepted by masses and thereby more applications are developed for such technology. But, if the technology is priced steeply, it will be classified as a premium product and will have limited acceptance and/or penetration.

We are of the view that, in urban areas demand will pick up as and when broadband services are available on competitive basis. In rural and remote areas the aim should be to make high speed internet connectivity available at reasonable rates quickly. One way to achieve the same could be by starting internet kiosks in remote villages so that the people at large will get a taste for the same. Satellite is the speediest option to start with. If mobile satellite service could introduce such facility, then even individuals can go in for their own connections. The advantage of mobile satellite service is that large antennas would not be required.

Further, if the consumers are able to transact their business with Governments (local, state and national), banks and other public utilities through internet, the demand will increase as commuting is becoming more and more difficult and expensive, whether in urban areas or from rural areas to the centres where such business can be transacted. Availability of information most frequently required by the users in the rural areas would be very helpful in improving the perceived utility of the access to Internet. Creation of such locale specific information data bases will be very helpful for promoting the utilization factor of Broadband services. Creation of such data bases in local languages is important. Text to voice translators would be very appropriate in rural areas.

Since Indian market is generally driven by lower-end of the consumer pyramid, another important criterion will be the end-consumer equipment used to operate broadband applications/technologies. By making broadband accessible on a variety of devices such as TV sets, projectors, mobile phones or any other handheld/compatible device apart

from conventional computer/laptop/netbook, will be imperative in addressing penetration issues and increasing perceived utility of the technology at large.

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

Making broadband accessible on a variety of devices such as TV sets, projectors, mobile phones and/or any other handheld/compatible device apart from conventional computer/laptop/netbook, will be a step in right direction to make this technology consumer friendly and enhancing its perceived utility to end-consumers. Moreover, provision of local content and language will work in favor of enhancing its acceptance amongst masses. Text to voice translators would also be very useful for enhancing utility and usage, particularly in rural areas.

**5.5 Do you agree with projected broadband growth pattern and futuristic bandwidth requirements? (Reference Para 2.35)**

Historically, it has been noted that demand curve is not linear but exponential when mass acceptance of any new technology takes place. India has already witnessed this for mobile and internet revolution. Broadband acceptance and usage will also demonstrate a similar trend. We appreciate regulator's fore-sightedness in projecting high growth rate of broadband services. More and more dependence and inclusion of internet in day-to-day life will impose pressure on bandwidth requirements as well.

To enhance rural penetration, it is important to understand the heterogeneity of the demands in urban and rural and hence set separate targets (such as volume of download vs. speed of connectivity), separate applications (multicast vs. unicast), separate architectures (community vs. household) etc. Once worked this way, it would give innovative ways of meeting the core and access requirements.

**5.6 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)**

In order to successfully enhance telecom infrastructure to support broadband access, the key issues of Access services and backhaul services need to be addressed. The key action point is to carry out mapping of entire nation to assess status and need for creation of Access services and backhaul services. It may also be noted that vast amounts of optical fibre cable, microwave, towers etc already exist by the virtue of networks of GAIL, Rail-tele, Power Grid, BSNL, Reliance and Airtel. Vast unexplored potential vests in the creation of an integrated network to enhance the national network backbone

Access Services can be achieved by creating clusters of Access Service islands with connectivity either via wire line or wireless, whichever may be more efficient terrain-wise

or cost wise. The creation of these islands in isolation will not be of much use unless they are connected to the national network. This requires backhaul services, which can link these islands to the national network, enabling them to reach out to the world.

The creation of effective backhaul services is a key ingredient to the successful enhancement of telecom infrastructure. This will effectively put the various scattered Access Service islands on the national map. Optical Fibre, microwaves, VSATs are some of the various tools that can be used to create an effective backhaul network. It may be noted that extensive networks of various organizations especially PSUs are already in existence with fairly deep penetration like that of GAIL, BSNL, RailTel, Power Grid, Reliance and Airtel amongst others.

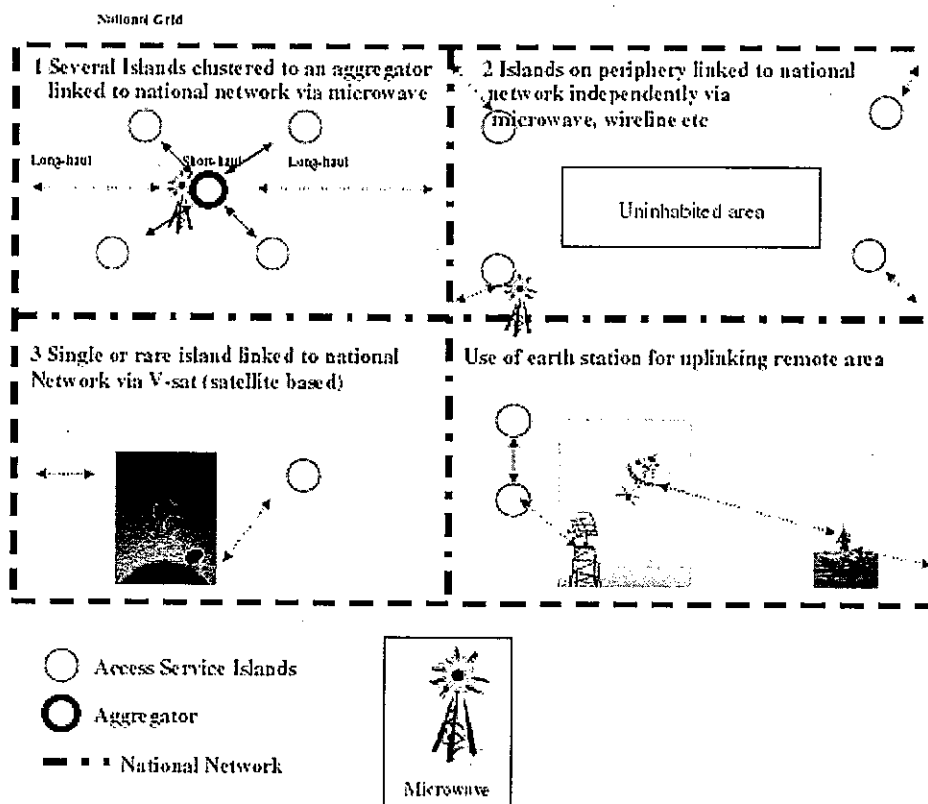
Clearly the existing telecom infrastructure is inadequate even to meet the demands in urban centers. While effective optical fibre network is the ultimate solution, it is going to take time and enormous resources. Increased use of satellite systems is important if broadband or at least high speed internet penetration is to be increased in remote areas within a reasonable time frame. Innovative satellite based solutions must be found. Ka-band satellites and Mobile satellite Services are two solutions that are readily available for implementation. Several satellite systems operating in Ku-band and capable of offering very high bandwidth are already in operation. Mobile Satellite Systems (MSS) also offer fairly high data rate connectivity in mobile environment. For India recourse to satellite based solution is inevitable to cover remote areas in a reasonable time frame.

#### **5.7 What network topology do you perceive to support high speed broadband using evolving wireless technologies? (Reference Para 3.22)**

Moving forward, a mix of technologies (like 3G, 4G, Wi-fi, Wi-Max) and access mechanism (like wireless, DTH, satellite) will be required to support high speed broadband, especially for sub-urban, rural and remote areas.

Access Services in rural India can be achieved by creating clusters of Access Service islands with connectivity either wire line or wireless, whichever may be more efficient terrain-wise or cost wise. The creation of these islands in isolation will not be of much use unless they are connected to the national network, enabling them to reach out to the world.

Wireless technologies (using long range antennas) and satellite communication can be effectively used to connect remote areas to national network. The depiction below suggests some of the examples of Access Services islands and clusters that could be formed and how they could link up to the national network.



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

Regulator has mentioned that use of copper cables to provide broadband is restricted by subscribers distance from the exchange. Speed is greatly reduced if distance is more than 3 kms.

We are of the view that broadband using DSL/ADSL technology must be promoted to effectively utilize vast copper network available in the country. To address the issue of speed/distance, we suggest reconditioning of copper pair to ensure reach upto 5 kms, since usually distance between subscriber and telephone exchange rarely goes beyond 5 kms these days.

**5.9 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)**

Although optical fibre provides highest speed and bits per second rate, it is an equally expensive medium of providing broadband access. A nationwide fibre network will take time and will need enormous resources and efforts. Even if resources are made available

in Indian conditions, the project is going to be very difficult to implement. Moreover, cost factor associated with optical fibre does not makes it a sensible option for last mile connectivity, except in case of enterprise or critical usage, while making an unviable business model for retail or small business consumers since onetime cost acts as huge entry barrier. Moreover, manual cost related to digging of ground and related clearances also adds a substantial cost to be borne by the end consumer.

**5.10 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)**

While viewing cable TV, a user is enabled to give a restricted set of commands via remote. While browsing internet, a user again gives limited commands (commands given by user can be to download data, visit site, etc); however instead of numeric command, commands are now alphanumeric and are to be given via keyboard (virtual and/or physical). Revised command-sets for broadband is not much different, but will require revamp and overhaul of existing network to provide additional service. Existing head-ends for cable TV signal distribution will now also act as medium for data/bits distribution. We are of the view to let the cable operators obtain appropriate UASL license and provide broadband services as well.

**5.11 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)**

Optical Fibre may be one of the reasons for clogging of backhaul in rural areas. However, optical fibre is not the only technology that can be utilized for providing broadband services in rural areas. With BWA spectrum auction, we see wireless technologies forming an integral part of broadband mix. As use of more and more new age efficient long range antenna systems become prevalent, broadband access using wireless technology will become a more optimized solution. Recourse for satellite based solution is inevitable to cover remote areas in reasonable time frame. Moreover, almost all parts of India are well-covered by fixed line network of state-owned carrier, which can be effectively utilized for providing broadband services.

Like every other technology, these technologies also have their own restrictions. For example, wireless may result in island formation and beyond a certain length speed is greatly reduced for copper wires. These restrictions call for a more consistent approach to develop optical fibre network for backhaul across the country. But costing has to be kept in mind for the same.

We are of the view, that instead of taking optical fibre to every village, it must be terminated at some comparatively densely populated zone and then other access technologies be used to provide last mile connectivity. Such an approach would greatly reduce the pressure on monetary resources.

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

In its consultation paper, regulator has set ambitious objective of taking optical fibre to every village with population more than 500. A village with 500 people will have approximately 100 households. Even with an above average penetration of 20%, only 20 households will opt for broadband service. Laying optical fibre for such small load is gross wastage of resources. Instead of taking optical fibre to every village, it must be terminated at some central and comparatively densely populated zone and then other access technologies be used to provide last mile connectivity.

**5.13 In order to create National optical fibre core network extending up to villages, do you think a specialized agency can leverage on various government schemes as discussed in Para B? (Reference Para 3.39)**

Regulator has weighed the option of forming a central agency to develop and operate core network. However, given the vastness of the country and analysis of historic trend, we observe that Indian telecom sector took off only upon competition from private sector. We are of the view that a symbiotic working by all players will be more conducive. Moreover, regulator has already permitted passive infrastructure sharing amongst operators. So, operators can easily share their core networks. As and when required, USO fund can also be utilized for this purpose.

However, a central agency on line of Wireless Planning Commission should be formed to monitor all players and take care of nitty-gritty of broadband planning in India. However, implementation of actual physical network must be left to service providers to a larger extent. We believe that multi pronged approach is the real solution. Similarly funding must come from diverse sources. Though Government's role is pivotal, private sector participation both in mass markets and in niche markets is essential to achieve success.

**5.14 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 up to village level and why? (Reference Para 3.39)**

We are of the view, that instead of taking optical fibre to every village, it must be terminated at some comparatively densely populated zone and then other access technologies be used to provide last mile connectivity – easing pressure from exchequers resources.

**5.15 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)**

Instead of planning and laying optical network from scratch, regulator must undertake a pan-India exercise to map-up existing optical fibre network presently available with all the service providers' alongwith tube capacity. Subsequent to existing network, a more cost effective approach would be to augment existing tube capacity and extend its reach. Owner of the tube to be paid in a manner analogous to sharing of infrastructure for fixed line carriers. Such an approach would not only reduce the cost of laying basic network of optical fibre but also shorten the time taken to ramp-up existing infrastructure.

**5.16 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)**

Time and again we have reinstated that moving forward; regulator must put emphasis on making regulatory framework both technology and service independent. There is no need to segregate broadband connectivity on the basis of technology and medium adopted by the provider. Service providers must be permitted to provide services via any technology

Since, technology is evolving extremely fast; imposing any regulatory or licensing barriers is going to be counterproductive. It may thus be prudent to allow broadband service providers to offer unified services.

**5.17 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)**

Broadband in telecommunications refers to a signaling method that includes or handles a relatively wide range (or band) of frequencies, which may be divided into channels or frequency bins.

As per International Telecommunication Union (ITU), usually broadband is associated with a particular speed of transmission or a certain set of services, such as digital subscriber loop (DSL) or wireless local area networks (wLANs). However, since broadband technologies are always changing, the definition of broadband also continues to evolve. Today, the term broadband typically describes recent Internet connections that range from 5 times to 2000 times faster than earlier Internet dial-up technologies. However, the term broadband does not refer to either a certain speed or a specific service. Broadband combines connection capacity (bandwidth) and speed. ITU Standardization Sector defines broadband as a "transmission capacity that is faster than primary rate Integrated Services Digital Network (ISDN) at 1.5 or 2.0 Megabits per second.(Mbits)".

We are of the view that for all practical future purposes, a data speed of 2Mbps or above can be classified as Broadband speed for India.

In the age of convergence, any rigid definition based on specific speeds/bandwidth is not very relevant. In fact operators must be allowed to provide speeds/bandwidth that the technology that they adopt permits. Regulator should ensure that the promised quality is delivered to the customer.

**5.18 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)**

Right Of Way (ROW) in rural areas can be addressed via stringing backhaul or even last mile connectivity over power transmission lines. This can also be done in collaboration with the SEB's and other power entities such that the infrastructure gets shared with the SEBs leading to better utilisation of connectivity as well. Stringing of optical fibre over transmission towers can also help reduce costs as digging/piping may not need to be undertaken and a good portion of Rs. 18,000 crore estimated for manual digging be saved and put to some other use. Achievement of rural backhaul can get a boost with this initiative, especially as transmission towers crisscross the length and breadth of the country, especially in rural and suburban regions.

For urban areas, a wiser option would be to let various service providers share optical fibre network. Also, while laying cable, service providers must keep extra space so as to expand capacity in future. This will not only help in lowering cost, but also result in quick scalability as and when demand arises.

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

Regulator has mentioned that 70% of broadband market is controlled by PSUs and top-10 ISPs dominate 95.23% of total subscriber base. With more than 10 ISP providers providing broadband services, it can easily be deduced that broadband sector is not lacking competition, with reference to number of players. In our view, the broadband is not being pitched and positioned appropriately to attract more users. There are various ways to tackle this namely, pricing, product variations on offer, quality of experience offered by different service providers.

However, sub-urban and rural areas pose a different picture. There is lack of competition in sub-urban and rural areas and services are non-existent in remote areas. To solve this problem, regulator should encourage multiple approaches like satellites, cable TV etc.

Since DTH services using dish antennas have spread to rural and remote areas also, TRAI should recommend the use of these systems for broadband internet by relaxing the regulations that are presently in vogue. Two way internet operations without recourse to V-SAT license should be allowed. Similarly, mobile satellite service that can provide internet connectivity should be encouraged.



The role of the ISPs is crucial and should not be diluted. The ISP provides both content and access and content is crucial for broadband to pick up in significant manner.

**5.20 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)**

We are of the view, that presently broadband pricing is such that this service be categorized as premium offering. Lowering of tariffs and introduction of flat and transparent pricing will indeed push adoption of broadband. Increasing competition while keeping other charges/levies at reasonable levels will also improve the situation.

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

Simple, transparent and flat broadband tariffs will certainly promote adoption of broadband in India since consumers will be able to clearly demarcate its impact on their monthly budget.

The operators must be allowed to device plans that would meet the requirements of different categories of people. However, the Regulator has to ensure that the operators do not confuse the consumer by a variety of plans that cannot be easily comprehended or compared. Some guidelines in this respect will be very useful and protect the interests of the consumers.

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

Regulation of tariff is against the principle of free market mechanism. However, regulator must keenly watch service providers to ensure that consumers get a fair deal and there is no cartel formation.

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

Tariff regulation is against the free market mechanism.

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

**5.25 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)**

- 5.26 What steps should be taken to bring down the cost of international internet bandwidth in India? (Reference Para 4.48)**
- 5.27 How can competition be enhanced in the International bandwidth sector? (Reference Para 4.48)**
- 5.28 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)**

*(Combined response to 5.24, 5.25, 5.26, 5.27 and 5.28)*

The regulator in the consultation paper has mentioned that high cost of international bandwidth forms one of the major reason of higher broadband charges in India.

In the consultation paper, regulator has recommended putting in place a pan-India fibre network to enhance reach and speed of broadband in India. However, broadband speed is directly impacted by the length of queue at international gateways. Also, cost component also cannot be reduced if majority of queries/requests are hosted outside India. Such high dependence on international bandwidth result in formation of choke points at international gateways resulting in deteriorating of QoS parameters, higher cost and lesser affordability amongst users.

We are of the view that Government should make concentrated efforts to push for hosting servers in India. For example<sup>5</sup>, if Indians spend 500 billion minutes per month on Facebook<sup>6</sup>, it makes sense to push for local hosting of Facebook server in India instead of every request serviced from outside India. This will result in huge cost savings since international bandwidth will be less utilized.

In case local hosting of servers is not possible, other advanced technologies such as setting up internet exchanges, caching, etc can be used to minimize the use of international bandwidth.

Less dependence on international bandwidth will also result in enhanced QoS parameters for users and as well as will help in lowering usage cost thereby increasing affordability and spread of broadband services in India.

- 5.29 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)**

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<sup>5</sup> Only for illustration purpose

<sup>6</sup> Source: TRAI Consultation Paper

We are of the view that high monthly tariff and higher cost of compatible equipments is impacting the broadband growth in India. Even so called, bandwidth hungry applications usually install a light client application to ease burden of bandwidth as it becomes more popular and traffic on its server is increased. Blaming performance of bandwidth hungry applications as one of the factors responsible for low growth rate of broadband services is not justifiable.

**5.30 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)**

We are of the view that the regulator must ensure while reaching out to a larger base, Quality of Service (QoS) and Quality of Experience (QoE) is not diluted by the service provider. Moreover, international norms must be followed for various parameters associated with QoS and QoE.

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

Regulator has only taken into account conventional examples of Customer Premises Equipment (CPE) such as laptop, computers and netbooks and has also acknowledged high cost of such conventional CPEs as an impediment to adoption of broadband in India.

Another, way of looking this problem is that, India specific conditions require not a specific gadget acting as CPE but some regular electronic gadgetry that can also work as CPE. For example, all households have a TV set, how about a reverse TV tuner card (used to watch TV on PC) that can let a conventional TV set act as a monitor for broadband. Or how about providing broadband services on a cell phone – use of cell phones is widely common across all geographies and economic strata. Only requirement is to develop interface that can make this possible – or is it presently available, just steeply priced !!

Need of the hour is to develop India specific solutions that can reachout to masses and make broadband a successful reality like cellular services.

**5.32 What measures are required to encourage development of content in Indian vernacular languages? (Reference Para 4.68)**

Content and application generation is based upon consumer profiling. Presently, broadband is primarily adopted by laptop carrying executives who pays approximately

Rs. 2,000/- per month. Accordingly, content and application is primarily built around such upwardly mobile consumers.

As more and more people will start adopting broadband, content and applications that suits their needs in local languages will also be made available. For example, today you can see sms in vernacular languages and various applications suited to different categories of subscribers. 5 years back such innovations in applications and contents were not heard of.

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

We are of the view that the regulator must work towards making regulatory framework both technology and service independent. There is no need to segregate broadband connectivity on the basis of technology and medium adopted by the provider. Service providers must be permitted to provide a service via any technology. Since, technology is evolving extremely fast, imposing any regulatory and/or licensing barrier is going to be counterproductive. It may thus be prudent to allow broadband service providers to offer unified services.

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

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

*(Combined response for 5.34 and 5.35)*

In a country where per capita income is Rs. 3,700/- per month<sup>7</sup>, an average monthly broadband bill of Rs. 2000/-, indeed classify the technology as premium product. This is well evident from broadband penetration statistics. Enhancing backend capacity is not the only solution to take this issue head-on. Real solution lies in competitive pricing of service and cost of equipments used to access broadband. Making broadband available on cell phones and television sets are few such examples of innovations in reaching out to masses. Need of the hour is to think out-of-box and develop mechanism of lowering entry point for this technology to make it easily accessible and adoptable. These are examples of market related issues and can be tackled only by enhancing competition in this space.

With recent auction of BWA spectrum, we are hopeful that India will witness more competition and consumer specific approach in this segment. Fiscal measures/subsidies have never been the solution to expand market size and we do not foresee this segment to be any different.

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<sup>7</sup> Approximately; Source: Media reportage