S K Gupta, Advisor (CN),
Telecom Regulatory Authority of India
Mahanagar Doorsanchar Bhawan,
Jawahar Lal Nehru Marg, New Delhi-110 002
Tel.: 011-23217915
Fax: 011-23211998
E-mail: advcn@trai.gov.in

Subject: Response to the Consultation paper on "National Broadband Plan" dated 10th June, 2010

Dear Sir,

We welcome the opportunity to respond to the Telecom Regulatory Authority of India's (TRAI) Consultation Paper on **"National Broadband Plan."**
We thank TRAI for this consultation paper which will help address the Broadband concerns in India. Please find our response to the consultation paper.
We would like to participate in any further opportunity to discuss these issues and looking forward to the counter-comments on the same.

Yours Sincerely,

Vismay Sood
MBA – Telecom Management (2nd Year)
Contact: vismay.sood@gmail.com
Mobile - +91-9689947410

Puneet Khanwani
MBA – Telecom Management (2nd Year)
Contact: puneetkhanwani@gmail.com
Mobile - +91-9689947005

Research Supervisor: Mr. Giri Hallur
Asst. Professor (Telecom)
SITM, Pune.

Symbiosis Institute of Telecom Management (SITM)
Symbiosis Knowledge Village,
Gram Lavale, Tahasil Mulshi
Near Lupin Research Park,
Pune, India – 411042

--Disclaimer—
Please note that the views presented below are solely of the students and not of the Institute.

5.1 What should be done to increase broadband demand?

Ans There are various ways and means of increasing the broadband penetration in India. Some of them are

1. Creating awareness among the rural and computer illiterate masses about the benefits of using broadband services in various areas like e-governance, healthcare, education and banking.
2. By providing affordable fixed plans firstly by segmenting the users and then setting the prices accordingly by providing high value premium services like interactive gaming, video on demand to high end customers and basic internet connectivity to low end customers.
3. Promoting government schemes on broadband services. Digital literacy programs must be introduced. Online government schemes shall save cost to the government and in that case savings can be passed to the users using e-governance.
4. Modifying the existing policies to draw investments for more innovative business models.
5. Bridging the infrastructure gap and setting up access devices can be drivers for broadband growth in India.
6. Low cost CPE (Customer Premises Equipment) along with relevant content in regional language and customer friendly GUI (Graphical User Interface).
7. Increasing the investments in the higher rate transmission mediums like Fiber optical cable lines.
8. The service providers should look to provide value added, bundled services.
9. The people should be made aware about new ways of creating, distributing, preserving, sharing and accessing digital content. They should also be made aware about the advantages in business through the use of broadband.
10. Subsidizing computer purchases for low income families.

5.2 What, according to you, will improve the perceived utility of broadband among the masses?

Ans There are certain factors which would improve the perceived utility of broadband among the masses

1. Smart phones bundled with applications that would cater to different user segment.
2. Providing the promised data rates as per the plans and the schemes subscribed by the users.
3. Cheaper customer terminal equipment. This can be deduced from examples of other countries where data usage picked up because of subsidized handsets.
4. By enhancing the concept of e-learning where the tutor can electronically teach and interact with the students, concept of web based learning and can be used as a source of education in the rural and less developed parts of the country.

5. The rural population can use the broadband services to connect village health practitioners to the doctors of the nearby cities and towns for consultations via video conferencing.
6. Promoting online government schemes and application forms. This will in turn reduce the cost for the government and the customer as well.
7. Content in local language can be the basis of acceptance of the service.
8. Set up of emergency wireless network using broadband services as a response to disaster or potential attacks.
9. With better connectivity the idea of increasing rural banking service can be realized sooner than later.

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

Ans Few measures that can be taken to enhance the availability of useful applications for broadband

1. Tie ups with E-Choupal, rural malls for rural area.
2. Tie ups between NGOs and Application developer. And this tie up can be supported through USO fund.
3. Presence of CFC in rural areas.
4. Pragmatic usage of USO fund. For e.g. the fund can be utilized for giving financial support or incentives to the regional application developers.
5. Local loop unbundling by the telecom service providers.
6. Enhance the visibility of internet and PCs to the rural market making people aware of it.
7. All government, public sector banks and school/colleges applications or documents must be exchanged online. For e.g. in Madhya Pradesh, Xth Standard exam forms are available and accepted in electric form only.

5.4 How can broadband be made more consumers friendly especially to those having limited knowledge of English and computer?

Ans There are various ways of making broadband consumer friendly with respect to users who have limited knowledge of English and computer. Some of them are

1. Setting up of English learning centers along with the basic understanding of using the computers and basic softwares would play a key role in increasing broadband penetration.
2. Applications with text in regional languages.
3. Creating awareness through manual demonstrations.
4. Promoting content through regional language.
5. Simple navigation and GUI (Graphical User Interface) for an application.

6. Use of text to speech and speech to text conversion softwares as a medium of comprehending the content.

5.5 Do you agree with projected broadband growth pattern and futuristic bandwidth requirements?

Ans The projected broadband pattern growth seems improbable unless there are certain measures taken to ensure the promotion of broadband services in India.

With as low as 0.74% penetration and 8.75 million subscribers as of March 2010 reaching a figure of 11.5 million broadband subscribers by the year end seems to be an unrealistic task as there is a net additions of around 0.15 million subscribers a month.

There are various reasons for the dismal future. Some of those reasons are

1. Lack of supporting infrastructure to offer the services.
2. Lack of PC penetration and awareness of broadband services among the masses.
3. Affordability is a major concern.
4. Variation in the promised and the offered data speeds.
5. Lack of investment and initiatives to penetrate in the rural markets.
6. Up gradation from the existing network to a newer network for higher data rates is a big challenge for the service operators.

On the other hand there are various reasons which can lead to realizing and achieving the figures projected. Some of the reasons are

1. Huge investment from the private sector in deploying the services as soon as possible.
2. By using the existing fixed line DSL copper cables to provide broadband services with optimum utilization.
3. Providing wireless broadband services using 3G and BWA with the quick roll out of services.
4. Reusing the spectrum effectively to support the growing bandwidth demand is essential.
5. With the cable TV being widespread across the country providing broadband using HFC (Hybrid Fiber Coaxial) cable can be used to provide services and can be adopted as a technology to provide high speed broadband connectivity and offering bundled services.
6. Effective utilization of the USO fund to promote broadband services in the rural segment.

With the advancement in technologies the bandwidth requirement for the projected penetration of broadband services would be met.

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?

Ans Yes the current infrastructure does not support the kind of broadband services we are looking forward to in the near future. DSL is the major broadband service medium which has certain limitations. There has been less investments in technologies like FTTx , Hybrid fiber coaxial which in turn would provide higher data rates.

There are certain measures that can be taken to create an infrastructure capable to support the broadband services in India. Some of them are

1. Easy access to resources like poles, conduits and roof tops at fair prices which can drive easy upgrades.
2. Service provider can follow a model in which WIMAX provides a backhaul service and Wi-Fi provides last mile connectivity. This would ease the infrastructure challenge in rural areas.
3. Ensuring level playing participation from all the ISPs who have been granted broadband licenses.
4. The government can maintain low public right to way (ROW) charges in form of public roads, bridges and tunnels which have direct impact on delivery of broadband services.
5. Government must form a SPV (Special Purpose Vehicle) with service providers for lying down of network in small cities and rural areas which would facilitate joint venture infrastructure construction.

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

Ans WiMax would be the ideal option for providing basic broadband service. As the cost of optical fiber is relatively high, operators can use WiMax which is low in cost for carrying huge traffic and meeting broadband demands with higher quality. The other factors like open patent pool facilitates the commercial feasibility of the technology worldwide. The constraints like managing cable resources, land acquisitions, conduit resources etc are typical impediments to the broadband growth.

The core network (between exchanges) can have dedicated WIMAX link. And the neighboring exchanges can be connected to each other. For the customer end, the access device can be Edge/3G enabled handset or Wi-Fi enabled laptops and these devices located under one cell can be served by one exchange.

Enhanced broadband experience in form connectivity anytime and anywhere i.e. mobile broadband can be provided using HSPA technology. HSPA offers broader coverage responding to the demand for mobile and basic broadband in areas not covered by WiMax.

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

Ans The optimal utilization of the existing copper network can play a significant role in boosting the broadband in India. The first and the foremost task are unbundling of the last mile which would enhance the data rates via DSL lines. The operator can come up with Broadband plans that would encourage users to use DSL for internet.

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

Ans Fiber based technologies are used to provide high speed data rates and can be a feasible option for providing broadband services in India. Fiber optics can provide much high data rates as compared to conventional DSL lines. Due to the lack of active units in the light path, the architecture of the system was simple, cost effective and offered bandwidth that was not, and still is not, possible to achieve by other access methods.

There are ways to encourage the use of optical fibers to facilitate high speed broadband. Some of them are:

1. Availability of Right of Way can be made and a tender/contract can be given by the government or private participation can be encouraged to lay down optical fibers. PPP (Public Private Partnership) model can be followed to build the infrastructure.
2. Barriers like Multi-Party approval, corruption at agency level must be eliminated.
3. Use of Wavelength division multiplexing technique which can provide high speed at lowest cost.
4. Use of active optical network can boost the experience by providing dedicated lines for the high data usage customers ranging between 100 Mbps to 1 Gbps.
5. Use of Passive optical network to provide services to larger number of people 32 to 128 having a total data capacity of 2.5 Gbps.
6. Promoting the extensive use of Optical fibers in enterprise business where higher data rates are the need of the hour.
7. Promotion of newer technologies like IPTV etc using fiber optics as the medium.

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?

Ans Since the government aim is to increase broadband connection and target figure of 100 million by 2014, it would be advisable to include Cable TV as a medium to increase broadband penetration. However out of 85 million Cable TV subscribers, only 10% i.e. 8 Million connection is capable to provide broadband access at present

Now to increase this percentage, the following recommendations are made:

1. Cable operators should be allowed to provide different services through ISP license alone.
2. Cable operators must be incentivized through USO fund for installing 2-Way amplifiers for providing internet service on the existing cable line infrastructure.
3. Headend in the Sky (HITS) can be allowed for Broadband services.

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?

Ans The primary reasons for the non availability of broadband services in the rural areas are the following

1. Lack of awareness among the masses for the effective utilization of the services.
2. High cost of service roll out and connecting the rural with the cities.
3. Laying the fiber optic lines doesn't provide feasible business proposition and delays the Return on Investment.
4. Lack of diversion of the USO fund for promoting the fiber optic lines in the rural areas.
5. High right to way cost for the deployment of fiber optic lines.
6. The unskilled labor and the cost associated with the digging of trenches for laying the transmission lines is a costly affair.
7. The cost of the equipments, poles, conduits used are on the costly side.

Yes non availability of the fiber optic lines in rural areas is one of the bottlenecks for effective backhaul connectivity. Service providers use access technologies (wireless, PSTN line, cable) to provide backhaul service from different villages/rural areas at block/ cities/district level and route it to their switching center/destination. While through these technologies access can be provided to villagers/subscribers using wireless/wireline access technologies, backhaul is the bottleneck.

To remove this bottleneck, the backhaul services for rural can be provided by WIMAX.

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

Ans India as a nation has taken a big leap forward in the field of telecommunication in last 2-3 years and the number of broadband subscribers have picked up although couldn't match the projected figures and the expectations.

Knowing the fact that major chunk of the Indian population resides in the villages offering broadband services by government funded initiatives, effective utilization of USO fund, and viable business proposition for future investments are the need of the hour.

To ensure inclusive growth for 6, 40,000 villages in India, there is a need to create national optical fibre network extending upto villages as every 10% increase in broadband penetration results in 1.4% increase in GDP. Broadband can also be increased via other mediums like Wimax, Cable and Satellite but Optical fibre is robust, stable and scalable solution

The broadband penetration will be crucial for various e-governance services being delivered in rural areas.

The topology shall include optical fibre in the backhaul i.e. from cities/district to Community Service Centers (CSC). From the last mile connectivity can be on DSL as providing fiber to every home would not be a viable option.

5.13 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?

Ans Leveraging upon a specialized agency for providing broadband facility does provide an alternate solution for increasing the broadband penetration among the rural masses. This specialized agency would be the one which would be solely responsible for the following

1. Preparing the list of villages to be considered for providing broadband services.
2. Designing the architecture layout for providing the fiber optic lines to these villages.
3. Working in association with the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) for digging the trenches and laying the optic lines.
4. Leasing out the transmission lines to the various telecom service providers for offering the services.
5. Maintenance and operations of the transmission lines would be managed by this specialized agency.

Various sources for the funds would be

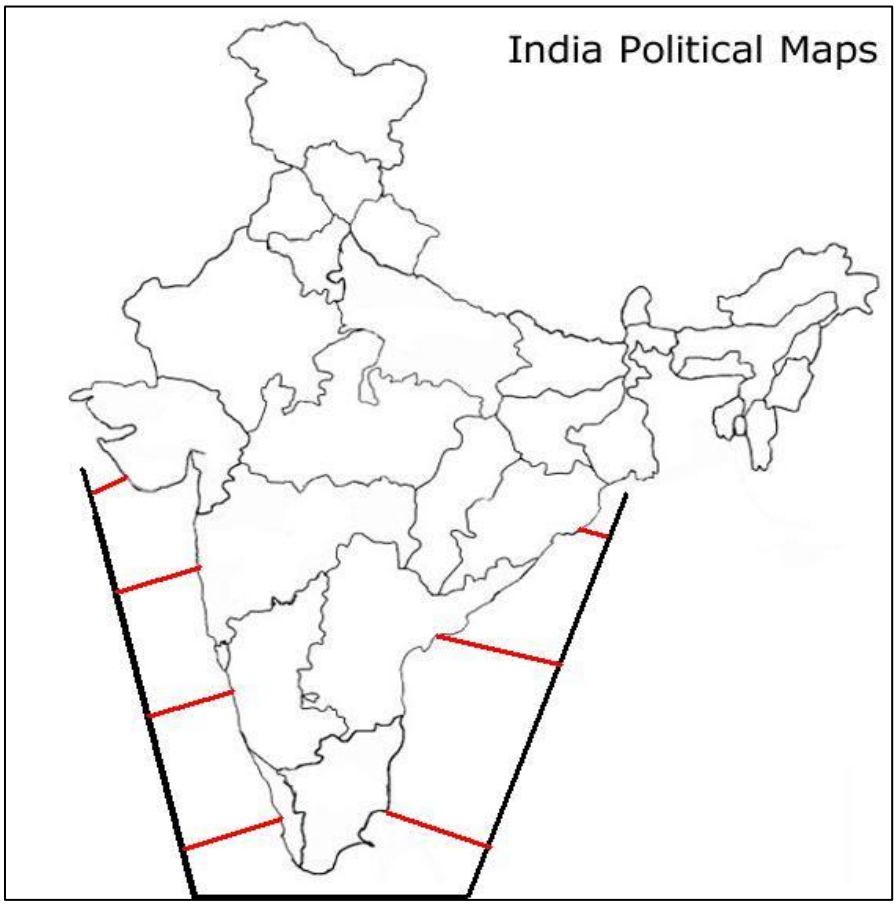
1. Government investment and funding.
2. Use of USO funds for buying material and equipments.
3. Maintenance and operation cost to be shared by the telecom service providers.

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 upto village level and why?

Ans Among the discussed frameworks for creating optical fiber network option 3, i.e. forming a consortium of service providers having clearly laid down framework for its functioning would be one of the options.

The reasons for the particular option are

1. This would provide a viable business model for the operators within the consortium to choose the areas of services as per their preference.
2. The consortium in India can be formed on the basis of International lines for e.g. North-South consortium and East-West consortium. This kind of model is being implemented by international consortium owning Submarine cables like SE-ME-WE. In future, an initiative can be taken by the government through which consortium for different circles can be formed on the international cable that is laid along its coastline as shown



The black color is the international cable that is passing along the coastline of India and the red color is the cables that would deliver the data to the circles as shown. The red

colored cables can be owned by the consortium belonging to different circles. Consortium of the respective circle can tie with the neighboring ones that don't have direct access to the international cable.

3. The services like managing the network, billing of the customer etc can be outsourced by the service operator thereby reducing the CAPEX.
4. One time deployment of the transmission cost would be a factor of concern initially but would result in a value proposition in the future.
5. The pricing for offering the services would be decided on the basis of the competition prevalent in the market.
6. The company or the organization would have an equal say and share of stake in the consortium.
7. The fiber lines laid would be entirely maintained and operated by the consortium members.
8. Since the operators would be providing the services in the rural areas they can look for USO fund as an option for funding.

Or

The other option could be a Public Private Partnership (PPP) model i.e. Option 2 because of the following reasons:

1. The presence of private sector would ensure the laying of infrastructure within time limits.
2. Also as USO Fund has only Rs. 10,411 Crores, the private companies can use their own funds for laying out the infrastructure.
3. The presence of government would ensure an equitable growth for all villages across the country and will play an important role in getting clearance from the respective local government for ROW.
4. The government body will also ensure about the standards that are to be followed while laying fibers along the road connecting villages.
5. Government body in PPP model will also play an important role in linking this Broadband Penetration Infrastructure program with Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS)
6. The presence of government is necessary for the successful expansion and roll out of the service as this can be verified from the examples of different countries

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

Ans The entire process of extending the broadband services to cater to the needs of the people from the villages has to be carried out in a very systematic manner taking into consideration the feasibility of the plan, areas and zones to be covered, infrastructure requirement gathering etc.

There are certain areas of consideration and precautions to be taken to ensure the continuity of services for a long time and to make it a natural resource in future. Some of them are

1. ROW clearance should only be given if laying of optical fiber on planned routes is feasible or else different paths/routes need to be considered and mutually agreed upon.
2. It is advisable to lay down optical fibres along the road. But this decision should be taken after considering factors like security, theft, weather, traffic etc.
3. Laying of fiber must not interfere in the operations of existing infrastructure.
4. Best route and place be chosen in order to save fiber or ensure minimal damage to the fiber during natural disaster.
5. Ensure protection from animals and birds.

Process	**Duration**
Information gathering	6 months
Architecture Design/ Network Planning	5 months
Right of Way clearance	3 months
Approval from Regulators	4 months
Purchase of equipments & fiber	4 months
Laying of fiber & Installation of equipments	16 months
Service operations and testing	6 months
Launch of services	1 month
Total	**45 months**

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)

Ans There is a need to define fixed and mobile broadband separately because the access instrument is different and in case of fixed there is a dedicated channel (always connected) present for data to a particular user and in case of Wireless there is no dedicated channel present for a particular user (Not always connected). If we keep the definition same, the wireless network will have to ensure that every wireless user get 256 Kbps speed always, but in reality it depends on the number of subscriber being served by a particular user. Also the speed received by a subscriber depends on its location from the BTS in case of wireless broadband.

Looking at the present scenario the first and the foremost step that should be taken is to enhance the connectivity among the masses.

The fixed and the mobile broadband although serve the common purpose except the platform used to consume the service is different.

As far as the fixed line broadband services are concerned there are certain parameters to be considered

1. Under the definition of fixed broadband services the data rates should be atleast 2 Mbps and above.
2. It should ensure 'Always on' connectivity to the users.
3. The data rates provided at the customer end should be similar to what is offered as mentioned and promised within the customer plan.
4. There should be a clear specification of both uplink and downlink speeds for the transmission of data from customer to the network and from the network to the customer.

For the mobile broadband services

1. Under the definition of mobile broadband services the data rates should be atleast 2 Mbps.
2. The data rates provided at the customer end should be similar to what is offered as mentioned and promised within the customer plan.
3. There should be a clear specification of both uplink and downlink speeds for the transmission of data from customer to the network and from the network to the customer.

Also, the parameters that can be used for new definitions are average speed per user, the type of Customer device i.e. fixed/wireless, and speed per user with directions mentioned i.e. Upstream and Downstream, Quality of Service (QOS).

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

Ans Yes, the present broadband definition of 256 Kbps which was defined in 2004 is very conservative. Today the average speed globally is 1.7 Mbps. Also the volume of internet is forecasted to increase fourfold during 2008-12.Cloud and grid computing which will be the future of internet that would require robust broadband infrastructure.

There is a change in internet user behavior like video chat, IPTV, online gaming, health education etc are bandwidth intensive applications. Also Video Clips, Video Streaming and Video Gaming require bandwidth in the range of 256 – 512 kbps.

The time has come to redefine the broadband as:

Broadband is a service referring to technologies which provide transmission rates of atleast **2 Mbps** in both directions for wired and wireless medium using various transmission mediums and can accessed via any device may it be computer, laptop, mobile etc.

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

Ans The ROW (Right of Way) are the charges paid by the telecom service providers to various agencies for laying the cables and setting up the telecom infrastructure.

In spite of various concerns and measures taken by the government bodies and recommendations from TRAI to standardize the ROW charges, it has not been implemented to the fullest. There are various ways which would ease grant of speedy ROW services at affordable prices. Some of them are

1. Uniform norms/guidelines across all states to service providers would standardize way of applying ROW charges.

2. The charges should be on the basis of various factors primarily the length covered while laying the cable, duration for which the services has to be used etc.

3. Minimize delay by keeping one agency/authority (Level2) per state for giving clearance be it for Highway, Railways and Forests. There can be multiple subordinate organizations (Level 3) at district level that would cater to information required by the agency (Level 2) giving clearance which can include data on underground utilities also. And there can be one superior agency at the center (Level 1) that would co-ordinate with Level 2 Agencies. Now this communication would give the entire picture of clearances for different states approved for a service provider. The service provider needs to get clearance for a particular state from Level 2 Agency only. Now this hierarchy will also ensure that there is no corruption taking place at local level. Special Level 3 Agencies can be created for giving information to Level 2 on Highways, Railways and Forests.

4. Local bodies and agencies (Level 3) should not have any say in ROW charges.

5. Clearance process should be well defined and the permissions should be granted to the service providers within the stipulated time frame once the request formalities are done.

6. Conversion Tax from Agriculture to Commercial must be abolished. Favorable terms and conditions must be set up (Service Provider must take responsibility for security and safety and he must ensure that the new cable must not interfere with the existing utilities of the land). If government can accommodate railway tracks between agricultural lands, laying down of fibres through forests should not be a concern.

7. Bank Guarantee can be levied till the licensee installs and restores the drenched part of the land.

8. The SLAs should clearly include the amount to be paid by the service providers as a penalty in case of any damage to the roads, foot paths etc during the time of laying the cables and there should not be any hidden charges for the same.

9. It is the responsibility of the services provider to ensure the security of underground installations and is liable for further compensations.

10. In case of repeated digging and reinstallation of the equipments the service provider has to bear the cost.

11. With the existing cost structure of ROW i.e. Rs. 1000 to Rs. 20000 per meter, the average cost for 11.46 Lakh KMs of fiber is Rs 281000 per KM. This is a de-motivating factor for the licensee as far as the ROW charges are concerned. There should be initiatives by the government to reduce this cost structure.

5.19 Does the broadband sector lack competition? If so, how can competition be enhanced in broadband sector?

Ans The broadband services in India has been offered by 104 service providers but top 10 ISPs dominate the market with around 95% of the market share. In addition to this 70% of the market share is being captured by the two PSUs. This shows the lack of competition in the market.

There are certain ways of enhancing the competition in the broadband sector. Some of them are as follows

1. Most of the operators out of 104 fall under the category of integrated operators which in turn help the top 10 operators to provide the services and hence act as a barrier in offering the service at the customer end.
2. Customizing the tariff plans of the subscribers as per the requirement and routine updates of the data usage should be delivered at the customer end.
3. The broadband services can be made more visible to the customers by reducing the fixed component i.e. the rental cost and unlimited packages should be offered for the price sensitive Indian customers.
4. The pay per use charges should be reduced and increasing the volume of usage would be a profitable model for the ISPs.
5. Differentiating the services and offerings like monitoring data usage and sending timely alerts to the customers regarding the prescribed data limits to avoid overshooting of data usage.
6. Quality of service and offering promised data rates would be a key parameter for deciding the competitiveness among the ISPs.

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?

Ans India has a very low broadband penetration and there are certain factors for the hindrance of growth of broadband in India. The major reasons are the lack of awareness of internet, high illiteracy rate, lack of handset and PC penetration and above all the usage charges are on a higher side for the masses that have the understanding to utilize the services.

The usage rate is high and for the price sensitive Indian market the operators fail to realize the importance of making customized offers to the customers. There are certain measures that can help in making the services more affordable to the users. Some of them are

1. By reducing the cost of hosting the content within India thereby reducing the operational cost for the service operator who in turn can offer the services at a lower price to the customers.

2. Techniques like mirroring or caching can be intensively used by the operators to reduce international bandwidth requirement and enhance customer experience.
3. There should be a methodology for the segregation of the international and national traffic.
4. The operators should opt for unlimited data usage plans for the price sensitive Indian customers and work on the model of increasing the volume of data usage with lesser margins and more users.
5. The broadband services can be bundled with the cable TV by making better offers at the customer end.
6. In India, the price paid for additional download (above data cap) is higher in wireless as compared to DSL. The situation is opposite in other countries. With the WIMAX services roll out, initiatives must be taken to lower these charges and make wireless more affordable as compared to DSL as WIMAX will be used to increase the penetration.

5.21 Do you think simple and flat monthly broadband tariff plans will enhance broadband acceptability and usage?

Ans For the price conscious Indian subscribers it is essential to make customized offerings to the subscribers. As far as the tariff plans are concerned the service providers should definitely look for penetrating further in numbers by reducing the profit margins but increasing the number of customers utilizing the services and this could behave as an apt model for the service providers.

Yes the simple and flat monthly broadband tariff plans will enhance the broadband acceptability and usage in India. In such a situation the subscribers would be able to utilize the services at will.

But there are many segments of subscribers which do not want unlimited package. For them customized options can be implemented such as:

1. Higher data rates during the night time.
2. There can be multiple tariff plans which suit the requirement and need of the customers categorizing on the basis of usage and data speeds.

5.22 Should broadband tariff be regulated in view of low competition in this sector as present?

Ans The broadband in India is still in the nascent stage which lacks competition. In such circumstances it would difficult to regulate the broadband tariff. Similar to what we observe in the cellular market the regulatory bodies have set a ceiling price for the call charges, interconnection charges etc that could be the options for the broadband service providers. The regulatory bodies can set a ceiling price for the rates to be charged to the subscribers for the data usage and data rates.

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

Ans There is no need to have regulations for setting up the tariff for broadband services as the players need to determine the price of the services on the basis of demand and supply and also consider the operational cost of services. It should be totally market driven strategy for the broadband service providers.

The regulatory bodies can take a few measures in determining the ceiling price of the services on the basis of the data usage by the subscribers.

This can be illustrated as for a data rates of 1 Mbps the subscriber cannot be charged more than **Rs x /-**. The price of '**x**' can be calculated on various factors which determine the competition in the market like

1. Usage pattern
2. Cost of maintenance at the operator end
3. Data rates

5.24 How can utilization of International Internet bandwidth be made more efficient in present situation?

Ans Since, most of the content is hosted outside India, utilization of internet bandwidth can be made more efficient by caching or mirroring of frequently visited sites within service provider network. Also domestic websites having domains like nic.in, gov.in must be routed through NIXI instead of IP Port.

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.

Ans There can be levels defined for ports. Level 1 i.e. NIXI and Level 2 for IPLC. After caching of popular website is done, the domestic traffic can be segregated from International traffic depending on IP address.

Yes, Since IP Port (Level 2) will only be used for carrying international traffic, there would be reduction in international bandwidth consumption and cost per MB will reduce.

Also, since the traffic through IP port will reduce, there would be reduction in revenues earned by International Internet bandwidth providers.

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

Ans The cost of international internet bandwidth in India is on the expensive side and there is a requirement of reducing the cost so as to make the broadband service affordable at the customer end.

The various measures that can be taken in this regard are:

1. Few players are owners of Cable Landing Stations. To reduce this, government must encourage participation of other players and ensure open access to Cable Landing Stations to them.
2. The service providers should gradually try to migrate from STM1 leased lines to STM 4 leased lines and subsequently to higher connectivity pipe size.
3. 10Gb pipe connectivity must be used as it brings down the cost per Mb. Such higher connectivity pipe size would increase the onetime cost for deployment but in future would fetch higher returns as they would have to shell out lesser amount for the bandwidth usage per year.
4. ISPAI must play an active role.
5. Segregation of international and domestic traffic.
6. Efforts to be made for content hosting domestically by caching frequently visited websites.
7. More competition coupled with allowing the resale of the bandwidth will reduce band width rates by 40%.
8. The retail prices are on the higher side so necessary measures have to be taken in this regard.
9. There should be a more transparent process for discounts offered by service providers to the retailers and the end users.

5.27 How can competition be enhanced in the International bandwidth sector?

Ans The international bandwidth sector for providing broadband service is very expensive as compared to other Asian countries. The competition can be basically enhanced by

1. Non-discriminatory, fair and open access to cable landing stations given by existing incumbents to all international long distance operators.
2. Forming a consortium where a revenue sharing model on the basis of data usage can be deployed and cost of higher pipe size and volume of data can be shared among the different operators within the consortium.

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?

Ans In the present context good quality of broadband has become very essential. The various parameters mentioned are to be considered in providing the service. Apart from these factors there are certain things which are ignored and have become need of an hour. Some of them are

1. All service providers must display on their websites in unambiguous form, the contention ratio adopted with different tariff plans. This will help subscriber to take informed decision.
2. The transparency in providing the details of the data usage included in the invoice and intimating the customer once the free broadband usage has surpassed. This should be an auto triggered process.
3. Ensure availability of minimum required bandwidth in their network according to maximum contention ratio. This will enable service provider to give the promised data rates as per the plans and the schemes subscribed by the users.
4. Ensure that a subscriber is always connected on-line.
5. Low Latency.
6. Disruption or discontinuity of services due to technical failures etc should not be more than a particular duration and if extended then compensation for the same has to be made by the service provider to the customer.
7. The customer care service and the prompt measures taken in order to resolve the customer queries would enhance the customer experience.
8. Short Service-Provisioning/Activation time.
9. Keeping in mind the above points and parameters, the service provider must segment the services as per the subscribers. QOS, Bandwidth and Contention ratio are the parameters that will be crucial for Upper and Upper Middle class and on the other hand affordability will be a key factor for Lower Middle and Lower class.

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.

Ans Yes the bad quality of broadband connections definitely impacts the performance of the bandwidth hungry applications and in turn hampers the growth of broadband services in India. Today with the extensive use of internet in various fields like online trading, purchasing, banking transaction etc require high speed reliable connectivity. In such cases if the broadband services are interrupted due to any reason would ultimately loss of revenue and growth of the business.

The service providers need to take certain measures to ensure the growth of broadband in India. Some of them are

1. In B2B enterprise applications the service providers should ensure high data rates with reliable connectivity.
2. With the applications requiring both upload and download the service operators should ensure high data rates and back up transmission medium for the same.
3. For high data rate requirement the service operators should make use of FTTx as a transmission medium.
4. Reduced latency for the transmission of packets from source to destination using proper protocols during transmission.
5. Timely up gradation of broadband network ensuring a fat backbone network for backhaul for emerging bandwidth hungry applications

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?

Ans Taking into consideration the bandwidth hungry applications the user expectation has raised quite a bit. On this basis it is essential to consider a few more parameters which can be included apart from the ones which are already covered

The parameters that must be mandated are

1. Reliability and availability of the desired services.
2. Security issues must be dealt with high priority.
3. Transparency in the billing and invoice.
4. Post service customer experience should be evaluated periodically.
5. Reduced latency.

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

Ans In the Indian market affordability of the customer premise equipment like PC, laptops has been the main hindrance to the growth of broadband. To overcome this issue there are certain measures proposed below:

1. The lowering of prices of the data cards for providing broadband service can be used as medium to increase the penetration.
2. The bulk deals for the CPE in rural areas and schools with basic configurations would in turn result in more usage at reduced prices.
3. The mode of recycling the PCs and laptops can be used as a medium to make the CPE more affordable to the masses.
4. Bundling of services with PCs and laptops having in build broadband connections at a subsidized rate can be used as an option.
5. Various incentives like reduction in taxes and levies.

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

Ans With the diversity of dialect that is present in the India, it is essential to encourage the content in regional languages to increase the penetration of broadband. There are certain measures that can be taken in this regard

1. More content development in the regional languages with high percentage of people able to comprehend it.
2. The conversion of content from one language to another using tools and softwares.
3. Conversion of text to speech and speech to text softwares can be used.
4. Setting up of English learning centers along with the basic understanding of using the computers and basic softwares would play a key role in increasing broadband penetration.
5. In India, a lot of efforts still needs to be made in case of standardization of Advance Support (includes high end localization, complex programming) while Standardization of basic support(Encoding, Keyboard, Fonts, Locale, Lexicon and Spell Checker is already done in India.
6. Fiscal incentives on revenues earned through the sale of local content softwares.
7. As rural is a huge market which is still untapped, government can invite tenders to upply local content applications which can be supplied as a part of its mission for increasing broadband penetration in rural.

5.33 Do you perceive need for any regulatory or licensing change to boost broadband penetration?

Ans The following should be considered

1. The latest guidelines available for broadband in India were devised in 2004. DOT and TRAI must come out with new guidelines that can explore the current opportunities available to its maximum.
2. Internet Service providers can be allowed to give license to Rural Virtual Network Operator (can be NGOs).
3. Regulation for VSAT can be amended to enable it to provide internet service to last mile.
4. Cable operators must be incentivized through USO fund for installing 2-Way amplifiers for providing internet service on the existing cable line infrastructure.

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

Ans There are various reasons for the lack of competition and subsequently is hindering the growth of broadband in India. Some of them are

1. Monopoly situation in Cable Landing gateways with only 3 operators. This must be opened up for all ILD operators.
2. USO fund must be utilized for establishing link between Internet Service Provider and Village. Also there was a proposal to use USO fund to connect local ISP to the main ISP (Cable Landing Station)
3. Provision in laws to be made to ensure 10 to 15 percent of capacity of cable landing station is kept for small players.
4. Last Loop unbundling of copper and providing the service to corporate.

5.35 What other fiscal/non-fiscal measures should be considered to boost broadband penetration?

Ans The various measures to boost broadband penetration are

1. USO fund can be utilized for subsidizing Customer Premise Equipment for low income groups.
2. USO fund can also be utilized for giving financial support or incentives to regional application developers.
3. Fiscal incentives in the form of tax rebate for manufactures of low cost Customer Premise Equipments
4. 4. Fiscal incentives in the form of tax rebates can also be given in calculation of AGR to Main ISP if the ISP is giving service to other local/small ISPs covering smaller regions.
5. Indigenous technologies must get financial support from the government.
6. As explained in 5.34, USO fund must be utilized for establishing link between Internet Service Provider and Village. Also there was a proposal to use USO fund to connect local ISP to the main ISP (Cable Landing Station)
7. As mentioned earlier, since broadband is taken as a part of infrastructure which would contribute to increase in GDP, finance should be made available from various institutions for establishing and upgrading network as this is one vertical of telecom that would make huge impact on the growth of economy.

****