CONSUMER PROTECTION ASSOCIATION
HIMMATNAGAR
DIST. : SABARKANTHA
GUJARAT

Comments on Consultation paper
On
Roadmap to Promote Broadband Connectivity and Enhanced Broadband Speed

Introduction :

India today is amongst the largest telecom markets in the world with over a billion subscribers and more than 80% mobile penetration. The growth in mobile telephony in the last few decades has been, in the true sense, game changing. We have achieved significant progress in the wireless voice narrowband space and we are now at the threshold of a digital revolution with focus on delivering quality broadband to the masses and leveraging its significant potential for economic growth and social inclusion.

While the economic impact of broadband connectivity is immense and has been proven time and again, it also has the potential of having a cascading effect on other sectors as well. From education and health to disaster management; from financial inclusion to e-commerce; from public safety to entertainment; broadband connectivity has the power to make

services and applications available to all to transform our country into a digitally empowered society and knowledge economy.

The world is on the cusp of the 4th industrial revolution, which encompasses cyber-physical systems, cutting-edge research in artificial intelligence and biotechnology, robotics, etc. It has the potential to cause massive disruption in our day-to-day lives and has the capability to empower individuals and communities, as it creates new opportunities for economic, social and personal development. India needs to capitalize on the opportunity presented in the digital revolution by ensuring rapid, scalable and reliable broadband network deployment.

COVID-19 made broadband access a necessity for many households and further underscored the depth of the digital divide.

"Broadband networks offer perhaps the greatest opportunity we have ever had to make rapid and solid advances in global social and economic development – across all sectors, including healthcare, education, new job opportunities, transportation, agriculture, trade and government services. In the twenty-first century, broadband networks therefore need to be considered as basic critical infrastructure, like roads, railways, water and power networks."

India has registered a two-place drop to 132 on the Ookla's Speed test Global Index for mobile broadband speeds in April. The average mobile broadband download speed in the country was 9.81Mbps during April while the average upload speed was registered to be 3.98Mbps for the same period. The drop in the mobile Internet speeds could be attributed to the massive surge in Internet usage in India due to the Corona virus lockdown. The latest ranking released by the global Internet speed tracker company shows India slipping even below Bangladesh among the

neighboring countries. India already ranks below Pakistan and Nepal in terms of mobile broadband speeds. India's average mobile download speed was 9.81Mbps and average upload speed in April was 3.98Mbps

ISSUES FOR CONSULTATION :

Q.1: Should the existing definition of broadband be reviewed? If yes, then what should be the alternate approach to define broadband? Should the definition of broadband be:

a. Common or separate for fixed and mobile broadband?

b. Dependent or independent of speed and/or technology?

c. Based on download as well as upload threshold speed, or threshold download speed alone is sufficient?

d. Based on actual speed delivered, or on capability of the underlying medium and technology to deliver the defined threshold speed, as is being done presently? Please suggest the complete text for revised definition of the broadband along with the threshold download and upload speeds, if required for defining broadband. Kindly provide the reasons and justifications for the same.

Comments :

a. Common or separate for fixed and mobile broadband?

Separate.

b. Dependent or independent of speed and/or technology?

Independent of speed and/or technology

c. Based on download as well as upload threshold speed, or threshold download speed alone is sufficient?

Based on download as well as upload threshold speed.

d. Based on actual speed delivered, or on capability of the underlying medium and technology to deliver the defined threshold speed, as is being done presently?

Based on actual speed delivered.

(i) Should the existing definition of broadband be reviewed?

Yes.

- Rapid grow of streaming video services, we urge TRAI to define broadband as web speeds of at least 50 Mbps.
- After seven year of maintaining the current benchmark of broadband speed TRAI should take a bold forward looking approach.
- The streaming landscape has changed so radically in the last few years that the Authority should raise the benchmark.
- So many companies have announced their own upcoming streaming platform that the term " streaming wars " has become a catchphrase.

- Some providers have also increased their 4k offerings which requires higher bandwidth than standard definition video.
- Amazon recommends broadband connection of at least 15 Mbps and Netflix recommends 25 Mbps.
- Multiple active streaming in a household would therefore require speeds significantly greater than 25 Mbps.
- The increase in the over the top services communities also increasingly depend on faster broadband speed to access high bandwidth applications such as :
    (i) Educational
    (ii) Entrepreneurial
    (iii) Tele health service
    (iv) Including rural areas and low income areas that are underserved.
    - Tele health services provide a way to lower medical costs for families living in areas without adequate health care services, however, unreliable and costly broadband impact rural communities ability to benefit from these services.
    - There should be Continuous revision of the definition of broadband may be undertaken in-line with growth of infrastructure. A roadmap should be created to align definition with global standards.

Definition of Broadband :

Broadband, a term applied to high speed telecommunication system, i.e. those capable of simultaneously support in multiple

information formats such as voice, high speed data services and video on demand.

Fixed Broad band :

Download speed : 50 Mbps

Upload speed : > 5 Mbps

Upload speeds of 5 Mbps or higher are generally considered fast internet speed for upload because they can easily handle the common activities of the average user. It will be beneficial for :

- Video calls or conferences
- Live tournament-style gaming
- Sending emails with large attachments
- Backing up data to online or cloud storage services
- Uploading videos to social media
- Working on live, cloud-hosted documents like Google Sheets or Docs etc..

a. Common or separate for fixed and mobile broadband?

Separate for fixed and mobile broadband.

b. Dependent or independent of speed and/or technology?

Dependent on speed.

c. Based on download as well as upload threshold speed, or threshold download speed alone is sufficient?

Based on download as well as upload threshold speed.

d. Based on actual speed delivered, or on capability of the underlying medium and technology to deliver the defined threshold speed, as is being done presently?

Please suggest the complete text for revised definition of the broadband along with the threshold download and upload speeds, if required for defining broadband. Kindly provide the reasons and justifications for the same.

Mentioned above.

Q.2: If you believe that the existing definition of broadband should not be reviewed, then also justify your comments.

Comments :

Mentioned above.

Q.3: Depending on the speed, is there a need to define different categories of broadband? If yes, then kindly suggest the categories along with the reasons and justifications for the same. If no, then also justify your comments.

Comments : Yes.

There should be two type of broadband speed depending on speed :

(1) Normal broadband speed, which content minimum broadband speed of 50 Mbps in which most videos of SD, HD, HDR, Gaming etc. can stream.

(2) High speed broadband which content 100 Mbps or higher for handling multiple users at once without major interruption in service.

Q.4: Is there a need to introduce the speed measurement program in the country? If yes, please elaborate the methodology to be implemented for measuring the speed of a customer's broadband connection. Please reply with respect to fixed line and mobile broadband separately.

Comments : Yes.

Broadband speed is the single most important commonly cited metric for characterizing the " Quality " of broadband service. Perceptions about broadband quality inform regulatory policy, end-user behavior (e.g., broadband subscriptions), investments in complementary assets (e.g., content and applications), as well as the marketing, traffic management, and provisioning decisions of network operators. Consequently, it is important to understand how speed is, and should be, measured.

Broadband access networks are the vital bridges tying users to the communication, content, entertainment, and marketplaces of the Internet. A healthy broadband service market will include a differentiated menu of service offerings from (hopefully) multiple broadband ISPs. For efficiency, market participants will need information about the range of choices available, the associated pricing, and information about the quality of service associated with the different offerings. Today, speed or data rate is the single most important technical metric for characterizing broadband service with faster speed equating to better performance holding other characteristics like price constant.

However, in the next few years, as the average speed of broadband increases, and the markets become more sophisticated, we expect that attention may shift towards a more nuanced characterization of what matters for evaluating the quality of broadband services. Issues such as availability - reliability and latencies to popular content and services may become more important in how services are advertised and measured. We welcome such a more nuanced view and believe it is important even in so far as one's principal focus is on broadband speeds.

The Measuring Broadband program should be ongoing nationwide performance study of broadband service in India by TRAI to improve the availability of information for consumers about their broadband service. This program should be built on principles of openness and transparency. The TRAI should made available to stakeholders and the general public the open source software used on both its fixed and mobile applications, the data collected, and detailed information regarding the technical methodology for analyzing the collected data.

The definition of the speed test should be clear :

There are multiple definitions of "speed" that are potentially of interest : is it a measure of potential throughput or *capacity* or is it as a measure of *average* speed as experienced by end-users? Is the focus the broadband access service or end-to-end performance? Is the goal to diagnose a potential fault or to benchmark performance? Is the interest in a single broadband connection, a geographic market, or some larger population?

There is significant variability in broadband speed measurements across providers, geographic markets, access technologies, and time, it is surprising how much variation can result from methodological differences in how speed is measured. Understanding these methodological differences is important to making valid inferences from the measurement data.

There are now a number of sites and organizations that measure the speed (and other characteristics) of a user's broadband service The data generated by such tests is often aggregated and reported in the trade press and in government reports and plays a role both in policy formulation and in decision-making by individual consumers. Consequently, how speeds are measured and how the data is interpreted can have important implications for market and policy outcomes. But the resulting speed measurements at times vary significantly. The differences can be even more pronounced at smaller geographic granularities. Differences in the methodologies account for most of the discrepancy. The proper interpretation is not that one test is "right" or "wrong" but rather the different tests provide different insights into the end-to-end performance under different workloads.

For any testing methodology, teasing apart the end-to-end tests and attributing performance bottlenecks to constituent parts is technically challenging. While the broadband access network can be the bottleneck, significant bottlenecks arise in home networks, end users' computers, and server side systems and networks. The dynamics and settings of TCP (the dominant transport protocol on the Internet) also play a significant role in determining the resulting speed that is measured. There is also an important question about systematic biases in user initiated speed tests.

Potentially users are running those tests in a diagnostic fashion when they are experiencing problems. The main point is that inferences regarding how ISP delivered speeds compares with their advertised speeds need to be undertaken with careful attention to the testing methodologies employed. Many testing methodologies are inappropriate for the purposes of assessing the quality of ISP access networks.

The Report should be based on the following measurement tests :

- **Speed**: This test measures the speed (download and upload) of each box over a 10-second period, once per hour during peak hours (7 p.m. to 11 p.m.) and once during each of the following periods: midnight to 6 a.m., 6 a.m. to noon, and noon to 6 p.m. The measurement results from each box are then averaged across the measurement month; and the median value for these average speeds across the entire set of boxes is used to determine the median speed for a service tier. The overall ISP speed is computed as the weighted median for each service tier, using the subscriber counts for the tiers as weights.
- **Latency and packet loss**: These tests measure the round-trip times for approximately 2,000 packets per hour sent at randomly distributed intervals. Response times less than three seconds are used to determine the mean latency. If the box does not receive a response within three seconds, the packet is counted as lost.
- **Web browsing**: The web browsing test measures the total time it takes to request and receive web pages, including the text and images, from nine popular websites and is performed once every

hour. The measurement includes the time required to translate the web server name (URL) into the web server's network (IP) address.

Tests should be conducted by using automated, direct measurements of service delivered to the homes of thousands of volunteers across the India. The Measuring Fixed Broadband studies began in 1st month of year with the release of annual reports based on data typically collected during a single month with few large-scale traffic events, such as major holidays, sports events or other elections, Peak hours etc.. The data analyzed in the Reports thus reflect stable network conditions that provide the most accurate view of a provider's performance under controlled conditions. The TRAI can works in collaboration with statistics and analytics firm supporting similar projects in other countries around the world.

The tests should be summarized below:

Application	Description
Web surfing	Browsing of typical web sites containing HTML, images and small rich media objections, e.g., Flash based banner advertisement.
Video download (peer to peer)	Downloading of TV show or movie from a legal P2P site.
Video Streaming	Streaming of a TV show in Real time.
File download	Downloading of large data files using HTTP or FTP, e.g., downloading new device drivers or software packages.
File upload	Uploading a large file to a server using HTTP or FTP, e.g., uploading a video to YouTube.
Online gaming	Online gamers value low latency and delay when sending or receiving data to a gaming server.
VOIP	Quality and reliability of VOIP calls are determined by a number of factors. Specific metrics includes: packets loss, jitter, and available bit rate.

TRAI should measure and collect the following data on an ongoing basis:

- Data speed (being a combination of the Download and Upload Speed)
- Data usage
- Download speed
- Upload speed
- Latency
- Jitter
- Availability
- Packet loss
- DNS resolution time (measured in milliseconds)
- DNS failures (measured as a percent of total DNS requests)
- Web page load time (measured in milliseconds)

Privacy Policy :

The TRAI should take the consumer's privacy seriously and incorporates numerous steps in the design of the software, infrastructure, and analysis to minimize risks to customer's privacy. All personal data should be processed in conformity with relevant Indian law and in accordance with policies developed to govern the conduct of the parties handling the data. The data should be processed solely for the purposes of this study and should be presented anywhere and in all online data sets with all personally identifiable information removed. A set of materials should create both to inform each panelist regarding the details of the trial,

and to gain the explicit consent of each panelist to obtain subscription data from the participating ISPs. These documents should be reviewed by the Office of TRAI, the participating ISPs and other stakeholders involved in the study.

Broadband development alliance :

Broadband development alliance should be established by Telecom Operators, Internet companies, Communications equipment manufacturers, and CAGs. The strategic advisory committee should be composed of TRAI, Ministry of I & B, experts from the sector of information and communication and CAGs, which will be responsible for formulating Broadband development strategies and providing directional guidance. Different activities like, consumer affairs, policy planning, technology innovation and industry promotion can be conducted. **Apart from this Broadband speed monitoring platform should be established by them.** There should be a web portal of the Indian broadband mapping project, in which consumer can find the interactive mapping platform showing the quality of internet delivered by broadband service providers across the India, just like in European broadband mapping project.

Q.5: Whether the Indian Telegraph Right of Way (RoW) Rules 2016 have enabled grant of RoW permissions in time at reasonable prices in a non-discriminatory manner? If not, then please suggest further changes required in the Rules to make them more effective.

Comments :

RoW policies are critical across all infrastructure providers and much needs to be learnt and strengthened to ensure more transparency, faster

deployment and ease of doing business for the industry. It is important that RoW for broadband infrastructure build-outs are seamless and time-bound.

The Right of Way rules are not yet to bring benefit to the telecom sector due to lack of clarity and implementation hurdles.

Deploying telecommunications infrastructure is complex, expensive and risky. It is relatively obvious why this activity is complex and expensive but it is less obvious why it is also risky. Operators must forecast likely demand for network services in the face of uncertain future consumer behaviour, unknown behaviour of competitors and difficult to predict technological change. The rapid pace of technological change accelerates obsolescence and makes long-term planning inherently more difficult.

If governments want to accelerate the rate of infrastructure deployment in the face of these types of challenges, they need to ensure that unnecessary obstructions are removed and that other barriers such as approval processes do not unnecessarily retard investment and rollout. This is not to say that appropriate approval processes are not necessary – they clearly are. But governments need to avoid unnecessarily burdening operators with costs and delays which will discourage investment.

Deployment of network infrastructure typically involves a number of activities. Prior to any of the activities taking place, permissions must be obtained from public and private land owners as applicable to access land for the erection of towers and poles.

In many jurisdictions it is evident that the process for obtaining such approvals is cumbersome, time consuming and inefficient. Depending on the location of the land and rights of way, the process may involve seeking

approval from multiple local government authorities and communities. Other evident concerns are that approval processes differ between local government authorities and that there is often a lack of understanding of the approval process among government officials leading to unnecessary delays in obtaining approvals.

In addition to a cumbersome approval process, infrastructure deployment is also hampered by other factors including:

- existing fiber infrastructure being damaged by subsequent construction works which are not aware of the existing infrastructure; and
- an absence of in-building standards for telecommunications equipment.

To address the evident concerns with infrastructure deployment and to assist in reducing the cost of infrastructure deployment the following actions are proposed:

- adopt national guidelines for obtaining approvals;
- adopt a one stop approval process;
- create a national database of telecommunications infrastructure;
- encourage infrastructure sharing; and
- develop in-building telecommunications standards.

We feels that to increase adoption of the new and advanced form of communication technologies and to implement the targets of the National Digital Communications Policy (NDCP), there is a need for Centre and

States to give RoW permissions for towers and OFC in a more supportive and timely manner for enhanced infrastructure and connectivity. Moreover, the RoW guidelines were cleared by the government, which will fast-forward India into the digital world by ensuring the rollout of optical fiber cables and over-ground telecom infrastructure, ensuring the success of Digital India Mission.

* "The Right of Way challenge has been a contentious issue for the Indian telecoms sector impediments and delays as a result of variable and complex procedures across states, non-uniformity in levies, and obtaining approvals from the Forest Department, Railways and National Highway Authority has greatly impacted planning and roll outs of towers and fiber across the country,"

* Lot of states are yet to implement them in practicality including appointing of Nodal officer to facilitate clearances from various authorities.

* State governments and local bodies are not fully aware of the explicit benefits that they could derive due to simpler RoW policy.

* There are still grey areas in RoW where local bodies use this as a revenue generating mechanism instead of levying costs just for the purposes of restoration. "As a result, rolling out optical fiber could turn out to be significantly expensive in certain localities in the country.

* The government should set up central or state level agencies to monitor the success of the policy, and report and resolve issues or disputes in implementing the policies.

* Another aligned thrust area of policy could have been towards encouraging real estate developers for deploying fiber access infrastructure in new buildings for enabling service providers to quickly deploy fiber

* The policy which currently covers only RoW related issues for accessing land for deploying network infrastructure, can also look at addressing land acquisition hurdles for deploying other critical network infrastructure like Data Centers, IXPs and telecom NOCs..

* The Department of Telecommunications (DoT) was also considering setting up a task force to oversee implementation of RoW rules, including land related issues in states but this has not happened as of yet.

* Industry sources say that in November 2018 Central Government has issued a notification by which levy of service tax on the services by way of granting "Right of Way" provided during the period from July 01, 2012 to June 30, 2017, by local authorities has been exempted from the retrospective effect. This is significant because for laying of the optical fiber, TSPs need permission from the local authorities i.e Municipal Committees, Gram Panchayats etc. These bodies charge certain fees by way of raising demand note as per the agreed/approved rates, for granting the RoW.

* Local bodies/municipal corporations passed such liability on the TSPs and instructed them to pay the same along with interest and penalty for the entire period.

Q.6: Is there any alternate way to address the issues relating to RoW? If yes, kindly elucidate.

Comments :

Infrastructure Guideline :

Infrastructure approval guidelines should provide a common reference point for all stakeholders involved in the infrastructure approval process. Such guidelines should establish a framework in which approval requirements for different types of projects, e.g. tower construction, fiber deployment, different types of land, e.g., private or public, different types of public land, e.g., roads, airports, schools, etc. can be identified and assessed.

Guidelines should take into consideration the different land law systems in each jurisdiction. The guidelines should set out a generic set of practices and procedures that need to be observed in the application approval process. They typically include:

- necessary supporting information concerning each project application and whether supporting information such as a certification of structural design is required;
- the timelines that must be observed for considering each application;

  where an application is rejected detailed reasons must be provided in writing;
- identification of situations where community consultation must take place and the process that must be observed;

- a schedule of fees for applications and approvals and the process for making payments; and
- the process to be followed where a dispute arises between an applicant and an approving authority.
- The guidelines should also provide the basis on which the TRAI could plan meetings with stakeholders involved in the approval process with a view to ensuring a better understanding of the objectives, practices and requirements of infrastructure approvals.

One Stop Centre Approval Process :

It is proposed that the infrastructure approval guidelines should be complemented by the establishment of one stop centre (OSC) model. The OSC model is used in some markets to facilitate more efficient rollout of telecommunications infrastructure. The OSC model involves the establishment of a government body that facilitates the licensing process by obtaining co-current permission from the relevant authorities (which may include local planning bodies as well as civil aviation and other authorities) on behalf of the infrastructure provider. Where the infrastructure provider must obtain multiple permits for site planning and installation, this model is especially useful and provides a practical means of dealing with bureaucratic inefficiencies. For example, the OSC could manage all interaction with the different authorities on behalf of applicants.

Example :

Greece's one-stop centre for BTS planning and permission Requirements and conditions that operators face in order to be granted a permit for base station deployment vary across Europe. Procedures can be defined at

different government levels, even though generally the local authority (municipality) is the main point of referral for the process. In addition, general requirements relating to regional or national levels of legislation usually have to be met. As the GSMA notes, it takes on average one year for an applicant to receive all permits necessary to deploy single base station antennas in Europe. As a general observation, most delays are caused by bureaucratic and time-consuming administrative processes and a lack of co-operation with operators. In Greece, the EETT (Hellenic Telecommunications and Post Commission) assumes the role of a one-stop licensing body, whereby applications are filed through the Electronic Submission of Applications System ('ESAS') and subsequently forwarded to the various competent authorities and agencies for co-current issuance of the relative authorizations or approvals. The final approval is then issued by the EETT. The competent authorities should respond back to the EETT through the EAFS within four months. Greece introduced the Law 4053/2012 on licensing antenna constructions to improve the approval process. Under the new provisions, the EETT facilitates approval across a number of agencies, including the Civil Aviation Authority and the Greek Atomic Energy Commission, and ensures compliance with the Standard Environmental Conditions and applicable city planning provisions. Authorities involved are obligated to update the EETT through the ESAS platform on whether the application is approved or rejected. If all authorities approve, then the EETT issues the final approval. However, if one authority rejects the application, then the operator or provider must renew the application process through the EETT.

Social orientation of broadband should be changed:

- Broadband should be listed as public strategic infrastructure; many provinces/cities should issue documents to promote the development of broadband, incorporating fiber optic network, telecom base stations and pipeline into local land-use plan and social & economic development plan for the first time, setting clear the land-use requirements for broadband infrastructure and guaranteeing the road right for broadband construction.
- **Draw attention of the Ministries :** As broadband has become national strategy, many departments of Indian government should realize that they should make contribution to the development of broadband. Many provinces/cities can establish trans-department broadband-developing leading group of which main leaders should be in charge
- **Performance appraisal:** Broadband development is included in the performance assessment of the government in many provinces/cities; some provinces can even establish some management mechanism for the development of broadband which should be provincial, city and county levels.

Best Practices in Ease & Efficiency of Rollouts by Country :

- **Right of Way :**

  USA •• Policies have been put in place for cost & time management of RoW

  UK •• Standardization of terms of way leaves over private property has been ensured for parity during deployments

China ••Work is being done towards simple and specific RoW policies

- **Dig-Once**

UK •• A Dig-once policy has been implemented along with access to other utility infrastructure; Promotion of infrastructure sharing has been done as well.

USA •• Dig-once policy has been implemented across major American states to ensure sustainability and reduce inconvenience and disruption to the public

- **GIS Mapping**

North America, Western Europe, Japan, South Korea	•• GIS mapping is used mandatorily for the deployment of new fiber

China •• All fiber outlay in China as a part of the "Broadband China" strategy is to be mapped on a GIS system

South Africa •• Private players with support of the Government, not only map but also display status of rollouts, using a real-time GIS rendition of fiber plans

Bangladesh •• A nationwide GIS map of optical fiber deployment has been rolled out in 2016 with a view of supporting any public or private infrastructure project in the country

- **New Building Guidelines**

UK •• Digital infrastructure provisions in new buildings has been mandated

USA •• 'Wired score' has been implemented giving real-time ratings to buildings that have broadband compatibility and readiness in major cities of data related to fiber, etc. impede the growth of optical fiber cable and related infrastructure.

Source: Secondary Research, Deloitte Analysis

Dig-Once to Co-deploy Multiple Utilities including Broadband

Utilities such as roadways, water, gas lines and deployments of broadband do not follow a synchronized digging policy, which leads to significant cost from activities such as digging, trenching, RoW and other reinstatement fees. The risks in this methodology are numerous, of which disruptions to public life and utilities are the highest. One of the key measures taken by governments across the world is the development of a dig once policy in conjunction with laying new roads and widening some as well. The key benefits of Dig-Once are as under :

1. Cost Saving :

Limiting the number of times public utilities and transportation channels such as lords, railways are dug help reduce the costs significantly, than adding infrastructure while they are being built. These savings are observed in urban environments primarily.

2. Incrementally access and reliability :

When fiber is installed, the reliability of a network sees a significant increment. Also, it is easier to expand the reach of Broadband network which are dependent on fiber infrastructure. Both these aspects benefit the overall Broadband adoption.

3. Public benefit :

Dig once led to the reduction in resistive digging in areas which have other utilities installed. This leads to the reduced risk of damages to existing utilities already serving the populace, thus reducing public inconvenience. Also, road traffic is not affected repeatedly reducing time.

4. Economic Benefit :

Laying down or fiber using the dig once methodology enhances the speed at which Broadband is rolled out. This adds to the overall economic benefit that the society draws from connectivity in Education, Business and Health care.

5. Increase rate of deployment of Fiber :

Since the duct/conduit for fiber is already present at the time of initial deployment, the additional fiber to be deployed can be done without much of a challenges. However, this is dependent on the overall health of conduit system.

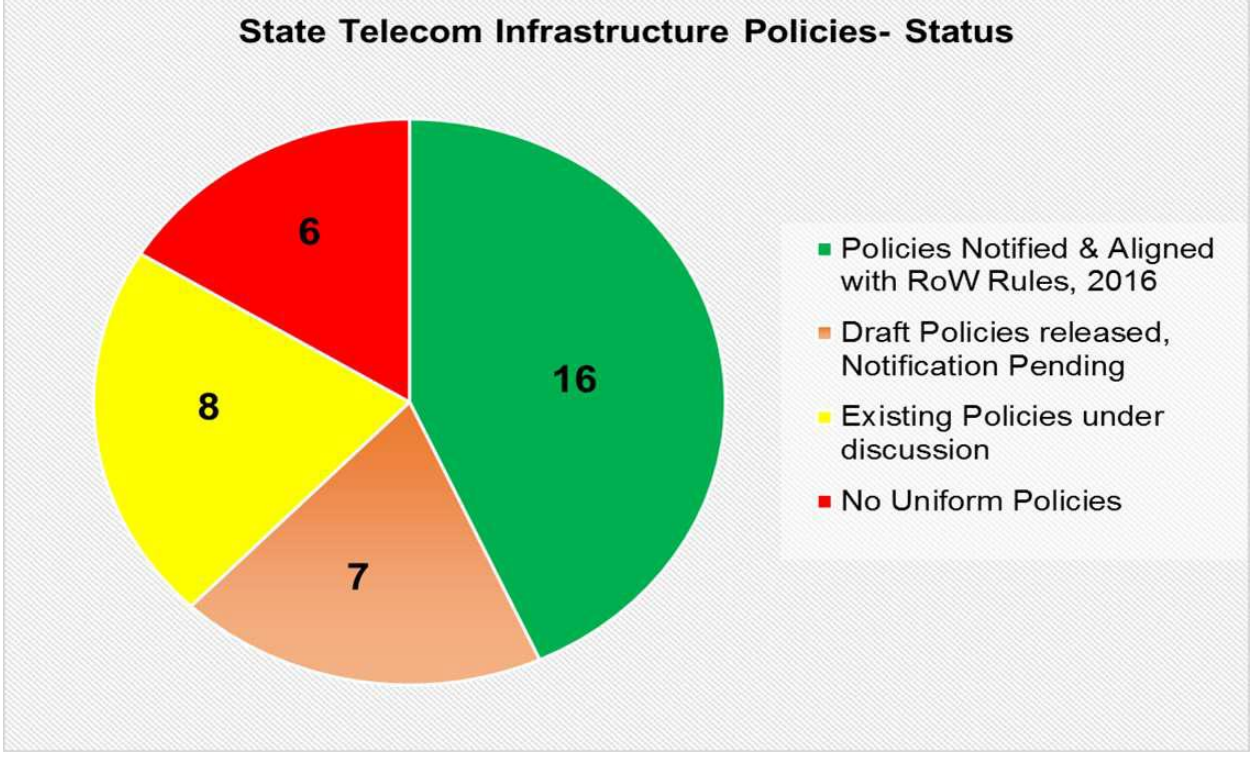
- The dig-once policy must be implemented across the country with no exceptions
- Laws need to be created to ensure that adequate compensation is made and met in the event of any damages to fiber infrastructure, due to digging by other utilities and players.

Q.7: Whether all the appropriate authorities, as defined under the Rules, have reviewed their own procedures and align them with the Rules? If no, then kindly provide the details of such appropriate authorities.

Comments : No.

With more than 3 years gone, only 16 states out of 36 States/UT's have broadly aligned their policy with Row policy 2016. Same needs to be expedited to enable telecom industry to build robust telecom infrastructure throughout the states.

Such policy anomaly in the States have deprived citizens and especially businesses from seamless network and internet connectivity and would impede rollout of new technologies like 5G, M2M/IoT etc. in the States.



Besides this, it has also seriously impacted various ambitious programs of the Government of India such as Digital India, Smart City, financial inclusion etc."

Such policies laid down by the various State Govt. has put on hold further expansion of digital infrastructure and holding back further investment by the industry.

Success of Digital India depends upon the innovative policy and enabling framework that government creates. A robust telecom infrastructure will play a key role in seamless connectivity, which is the essence of true "Digitization."

Also to address the issue, the Urban Development Department (UDD)/IT Department of the various state govt. which seems to be responsible for framing the policy for installation of telecom infrastructure in their respective States have come out with their own policies which are completely misaligned with the Indian Telegraph RoW Rules 2016 of the Government of India.

The tower policy has salient features such as permission for Cell on Wheels (CoW), Nodal Officer to be appointed by the appropriate authorities for providing clearance of permissions, no location-based restriction for installation the mobile towers, 60 days' timeline for clearance of application, no Coercive action against towers without consent from TERM cell related to EMF issues, online right of way portal to be developed within one year for ensuring timely approvals of applications and no Coercive action against towers without consent from TERM cell related to EMF issues etc. is not established in some states.

Q.8: Whether the RoW disputes under the Rules are getting resolved objectively and in a time-bound manner? If not, then kindly suggest further changes required in the Rules to make them more effective.

Comments : No.

No framework established for dispute resolution in any state.

State/UT Telecom infrastructure policies needs to be aligned with Indian Telegraph RoW Rules 2016.

In Bihar, existing policy of 2012 & 2017 is not aligned with RoW rules, 2016.

Common key issues in states hindering rollout :

(1) Multiplicity of policies :

Various departments in states have issued their own policy for installation of telecom towers resulting in delayed telecom infrastructure roll-outs.

For instance – West Bengal, Bihar, Sikkim etc.

(2) Absence of single window clearance.

Approvals required from multiple authorities and multiple NoC's such as Fire Services, Airport Authority, Forest Department, etc.
Delay hinders the roll-out of new sites

(3) Multiple fees/levies :

Exorbitant Charges being levied under heads of One time charges, Renewal Fee, Developmental Charges which varies from Rs. 10,000 to

Rs. 8,00,000 such as Rajasthan, West Bengal, Bihar, Sikkim etc. which is not aligned with RoW rules, 2016.

(4) Non implementation of notified policies :

State Policies notified & aligned with RoW rules, 2016 are not getting implemented down the line and permissions are getting delayed, which is impacting the overall Telecom Infrastructure growth in the respective States.

(5) Non availability of Government land and buildings.

Non-availability of Government Land & Buildings for installation of mobile Towers Results in non-ubiquitous coverage leading to call drops, poor QoS, coverage gaps.

(6) Security of telecom infrastructure :

Cases of thefts and vandalism like diesel pilferage, battery thefts, resistance from local bodies & residents etc. are on a rise. Leads to network breakdown impacting quality of services.

(7) Non availability of power :

Non-priority electricity connection and lack of Availability of Grid Power in various pockets of the country.

(8) Coercive action by state/local authorities :

Arbitrary Sealing of Towers / Fiber Cuts, Electricity disconnection impacting downtime and degrading the Quality of Services

Q.9: What could be the most appropriate collaborative institutional mechanism between Centre, States, and Local Bodies for common Rights of Way, standardization of costs and timelines, and removal of barriers to approvals? Justify your comments with reasoning.

Comments :

- Alignment of State Telecom Infrastructure Policy with RoW Rules 2016
- Comprehensive Policy covering Underground (Fiber) and Over ground (Tower) Infrastructure both
- One-time Nominal Fee to cover only Administrative expenses
- Single-window Online Clearance in a time-bound manner (deemed approval)
- No restriction to be imposed on locations of mobile towers
- Availability of Government Land & Buildings for installation of Mobile towers
- Electricity connections to be provided on priority at industrial tariffs
- Strict penal norms in State Telecom Policies for security and safety of telecom infrastructure
- No coercive action without prior intimation to the affected party
- Grievance Redressal mechanism by formation of STC/DTC
- Common Duct policy under Dig Once umbrella

There should be three considerations :

(i) Serving for national economy and social development.

(ii) Treating for construction of next generation information infrastructures as a goal and pushing forward collaborative development between broadband and industry.

(iii) Seeing from the angle of the overall situation, planning and coordinating broadband as a whole and identifying top design and layout.

There should be five principles :

• Combining government guidance with market regulation

• Combining overall planning with gradual development

• Combining network construction with application services

• Combining network upgrading with industrial innovation

• Combining broadband penetration with security

Key Recommendations on deployment of tower infrastructure

1. Single window clearance :

Establishment of a single window system of obtaining clearance, which must be online. This measure would enable rapid development of wireless infrastructure in a time bound manner. The authorities participating in single window framework could include Local Government, MoD, NHAI, AAI, Electricity transmission and distribution companies, Water department etc..

2. Time bound clearance :

Delay to be prevented by establishment of a SLA driven mechanism that has to be rigorously followed. Application needs to be acted upon by the single window authority in the pre-decided timeframe and reasons for rejection be given in writing to the applicant.

3. Fees :

Onetime administration fee can be implemented that would cover the cost of administration and generation of the permit.

4. Power :

Power connectivity from the national power grid could be made available on priority for rollout of towers, thereby reducing load on the consumption of fossil fuels, reducing cost and overall emissions. **Saving from these could then be passed on to customers in the form of less expensive broadband connectivity.**

5. Alignment of policies :

Alignment of state tower policy with the DoT's tower installation guidelines.

Q.10: Should this be a standing coordination-committee at Licensed Service Area (LSA) level to address the common issues relating to RoW permissions? If yes, then what should be the composition and terms of reference of this committee? Justify your comments with reasons.

Comments :

Previously same guidelines was given by ministry of Communication vide letter No. 16-12/2014-CS-111 dated 28.10.2014.

New method should be discovered.

Q.11: Is there a need to develop common ducts along the roads and streets for laying OFC? If yes, then justify your comments.

Comments : Yes.

One of the best practices in developing Telecom infrastructure is the Common Duct 'Dig Once Policy. In a 'Common Duct' approach, a common OFC will be laid and it will facilitate a range of services like Internet,

Electricity and Cable TV et al. This will have bigger ramifications in terms of each company laying its own duct and enables sharing of infrastructure and greatly simplify to meet RoW guidelines.

"The future cities will be built on ready fiber network for enabling ubiquitous and seamless connectivity. The common duct will play an important role in laying of fiber and can be used by IP-I, TSPs, cable operators, ISPs, and public utilities. Moreover by virtue 'Dig-Once policy' a 'Common Duct' laid and that will enable IP-I/ TSPs/ISPs/Cable-Operators/Other stakeholders to lay fiber easily for providing the broadband/cable services.

- If there are 40 families in a high rise apartment who have babies, and need surveillance facilities, each apartment going for an individual connection from the telecom service provider would involve a huge amount of money. But fiber based internet or peer network could connect all 40 flats for a much smaller price.

Q.12: How the development of common ducts infrastructure by private sector entities for laying OFC can be encouraged? Justify your comments with reasoning.

Comments :

Following steps can be taken for the development of common ducts infrastructure by private sector entities for laying FCC :

Time bound permissions, fees, charges and uniformity of policy remain critical to the deployment of fiber-based broadband infrastructure.

Implementation of best practices such as Dig-Once shall help increase reliability and security of the infrastructure.

1. **Single Window Clearances :**

   Single window clearances for rapid deployment of broadband infrastructure.

2. **Uniform RoW Policy for Broadband Infrastructure :**

   Pricing, timelines, transparency and synergy between multiple Authorities.

3. **Standards for Sustainable Infrastructure Deployment :**

   Establishment of standards for deployment of fiber infrastructure.

4. **GIS Mapping & Fiber Checks :**

   GIS mapping, and fiber health checks on timely basis.

5. **Dig-Once to Co-deploy Multiple Utilities including Broadband :**

   Dig-once policy implementation for prevention of public and utility disruption.

6. **Utility Corridor :**

   Construction of utility corridors.

Uniform RoW Policy for Broadband Infrastructure:

Ambiguity around the process to obtain permissions, and delays caused due to administrative paperwork and complex processes highlighted by authorities at the local Government level, are major delay-causing factors. It has been observed, and often raised by industry players, bodies and other ecosystem stakeholders that Right of Way tends to be the biggest hurdle in the process of deploying networks.

Multiple authorities:

The current framework for obtaining clearances for infrastructure rollouts requires approaching a myriad of bodies (such as NHAI, Railways, oil PSUs, water boards, electricity boards, etc.) to obtain permits. A reason for the significant delays is the lack of coordination between them.

Lack of uniform pricing policy:

While the policy for RoW is drafted at the center, the aspect of pricing of RoW permits remain at the discretion of local bodies. Lack of parity across geographies and demography (such as different prices for RoW in Delhi, Mumbai etc.) creates uncertainty and variations in business viability, thereby playing the role of a deterrent to network rollouts.

Undefined or unfollowed timelines:

The process for granting clearances are recommended to have defined timelines. For instance, the outlay of fiber and related RoW permissions must be granted in a specific period of time. Delays in obtaining clearances lead to a direct impact on cost of deployment (Interest cost of borrowing for infrastructure/equipment purchase, loss due to service unavailability to end consumer, loss due to network gaps in capacity augmentation etc.). **These mounting costs either deter the deployment of the infrastructure or are passed on to the customer, making broadband affordability a concern.**

Key Suggestions :

A uniform RoW policy must be instituted by the Government of India, and must be implemented by local government.

•• This policy may rationalize costs depending on city type with arbitrary levies being stopped. Additionally, the only admissible charges could

be towards reinstatement or charges directly linked to restoring the surroundings to their original state.

•• A collaborative approach needs to be taken to create and execute a uniform RoW policy between all Government departments such as MoE, MoD, Railways, Oil & Gas, NHAI, Power, Water and others.

Single Window for clearances:

- The Government must institute a single window policy for clearances and approve.
- This process may be online and must have defined timelines with reasons for application rejections being given in writing to the applicant.

Standards for Sustainable Infrastructure Deployment:

To ensure a sustainable, scalable and reliable network asset that ensure network synergies across the country, it is critical to adopt global standards and customize them for infrastructure rollouts in India. Fiber optics networks (core, metro-core, backhaul and access) have the capacity to provide right connectivity for the broadband infrastructure to support subscribers with multi-gigabit speed, requiring very low maintenance, low latency and best-in-class reliability, scalability and future proof connectivity sustainability including 5G technologies with limited distance-dependent quality of service. Fiber-based backhaul networks play an important role in achieving broadband coverage and prepare the migration from high to very-high speed fixed and mobile services. These standards would include depth of trenching, size of ducts depending on the areas and type of cabling there is, deployment methods, etc. Additionally, setting standards enables the broadband infrastructure process to become sustainable from an environmental perspective.

The life and quality of the OFC network is critically dependent on the physical network design and installation practices. Global standards and scalable network design will optimize the network sizing and installation of the network. This also needs program management expertise to ensure longer asset life.

•• Duct/Conduit design:

Material and dimensions of conduit or duct that would be used for the purpose of fiber installation

•• Inner-duct installation standards:

Type of gaps in the placement of fiber, in the case of conduit based or direct underground deployment.

••Method:

Pulling and jetting are the predominant methods for laying OFC. Appropriate standards need to be set to ensure that the cable is not put through stresses in the process of laying.

•• Digging and trenching:

OFC should be laid below 1650 mm in a flatbed trench to reduce attenuation losses due to undulations and sharp bends. Wherever the depth is not achieved due to strata conditions or any other terrain challenges, well-engineered physical protection should be given to the duct/cable

•• GIS Mapping:

To ensure traceability of the installed cable during the maintenance stage, the entire Installation parameters should be recorded in GIS and updated periodically during maintenance phase.

•• **Tools & materials:**

Specific tools and material need to be used to ensure that fiber laying and commissioning is incident free and long lasting

•• **FTTH:**

Standards to lay down the material requirement, design and constructional requirements, installation details and methods of tests for Optical Fiber Cables for FTTH application is needed.

•• **Skill & manpower development**:

Training must be imparted to the technicians and laborers who deploy fiber and electronics. They may be further certified as well. These credentials may be used to qualify agencies for deployment of fiber and electronic broadband infrastructure.

•• **Program Management**:

Effective program management during installation phase will ensure faster deployment, adherence to installation guidelines and ownership based project management.

Q.13: Is there a need to specify particular model for development of common ducts infrastructure or it should be left to the land-owning agencies? Should exclusive rights for the construction of common ducts be considered? Justify your comments with reasoning.

Comments : Yes.

A particular model for development of common ducts in infrastructure is necessary.

Advantages of laying a common duct: .

- ❖ Laying of a common infra-structure at one go would enable different organizations to lease/buy a duct for their needs, in which only the optical fiber would have to be blown. .
- ❖ The investment in cables would be deferred to only when needed.
- ❖ The digging, restoration and re- digging of the roads would be avoided as chambers/manholes would be provided at suitable intervals to lay the fiber.
- ❖ Hassles of arranging RoW permissions would be avoided.

Since the common cost would be incurred only once, this would result in cost savings for the investor and reasonable sale rates to the buyers.

Should exclusive rights for the construction of common ducts be considered?

Public-Private Partnership (PPP) :

1. In order to reduce the implementation time and ensure smooth sale/leasing & operation and maintenance of the infrastructure, it is better to utilize technical and financial expertise of private sector.
2. The implementation, operation & maintenance of the duct Infrastructure should be done by a contractor selected through competitive bidding. This will reduce Government's involvement and reduce requirement of its limited human resources.
3. When O&M for next 20 years is given to the implementing agency, they will ensure good quality of work so that their O&M expenses are minimized. Implementation by third party will also ensure minimal requirement of funds from Govt.

4. Minimum Intervention by Government :

The Government should avoid day-to-day intervention in sale/auction/lease of the telecom infrastructure. It should also leave the pricing of sale/auction/lease of ducts to the implementing agency. This will allow the implementing agency to vary their prices based on demand at a particular point in time.

Implementation Policy :

To implement the project successfully it is imperative to plan a strategy of implementing it. The key points in strategic plan are:

1. No permission for further digging and trenching shall be given on the routes where common duct has been laid.

2. Pre-booking of the duct shall be done as a part of marketing to ensure constant source of revenue prior to laying it.

3. The TSP may lease duct from agency investing in the duct network on IRU basis for a set period of time. . Maintenance shall remain with the agency investing in the duct network. The service Level Agreement between this agency and TSP shall include the O&M expenses payable by TSP annually and penalty may be deducted for any loss made to service provisioning due to cut in duct.

National Infrastructure Database :

To avoid costly damage to infrastructure, disruption of service and possibly personal injury it is important to ensure that underground infrastructure such as fiber optic cable and ducts are protected from subsequent construction projects.

International best practice is to create a national infrastructure database so that before any new project commences the location of existing infrastructure can be identified. Such databases are a requirement for creating a 'dial before you dig' organization. These organizations are supported by electricity, gas, communications and water companies – as well as many other private enterprises. They provide an "on call" service which provides very detailed information of the location of underground infrastructure in a given location.

Another important benefit of infrastructure databases is that they enable coordinated collaborative construction and development of infrastructure assets. For example, national backbone fiber can be laid down in association with the construction of rural roads resulting in significantly lower costs than if these were undertaken independently at different times.

The creation of national infrastructure database could initially focus on telecommunications infrastructure owned and operated under licenses. Operators would essentially need to share their existing records and agree on common practices in the recording of infrastructure related data.

There would also be considerable value to mandate that all municipal and utility infrastructure as well as public property should be opened to all operators for the deployment of digital infrastructure. Future civil work should design and deploy telecommunication ducts and open to all operators. Cross-ministerial communication to ensure the maximum of cross-sector infrastructure sharing should be supported. The lease price of public infrastructure could be regulated to minimize broadband deployment cost.

Q.14: How to ensure that while compensating the land-owning agencies optimally for RoW permissions, the duct implementing agency does not take advantage of the exclusivity? Justify your comments with reasoning.

Comments :

Mentioned above.

Q.15: What could be the cross-sector infrastructure development and sharing possibilities in India? Justify your comments with examples.

Comments :

The motivation of broadband network operators to access and use infrastructure built for other sectors is driven by the need for cost-effective upgrades of their networks to satisfy bandwidth demand growth which requires exponential increases in Internet throughput capacity. Meeting this demand requires fiber networks. It also requires additional mobile towers. These investments require extensive new civil works or the use of existing land corridors and infrastructure. Network operators who share infrastructure within or across sectors to support fiber rollout may more quickly achieve benefits of scale by reducing their fixed costs. Sharing existing electricity transmission towers, water towers or other infrastructure for mobile radio base stations can reduce costs and regulatory barriers for new tower sites.

The opportunity for cross-sector infrastructure sharing to support public telecommunications networks is greatest with infrastructure owners

in various network sectors. These may include owners of roadways, railways, water and sewer systems, electricity transmission and distribution systems, and petroleum and gas pipelines.

Several types of infrastructure used in the network sectors are useful for sharing with commercial telecommunications network operators. The universally appealing assets are the land corridors established for roads, railways, electricity transmission lines and pipelines. In addition, the improvements and fixtures in these corridors are also sometimes good candidates for sharing. These include the ducts, conduits, poles and towers used for electricity lines, the inside of pipes used for water, sewer, steam or gas transport, water towers, radio towers used for the private radio networks of utilities, and excess dark fiber in the internal networks installed by utilities and other infrastructure owners. Such sharable infrastructure can concurrently support telecommunications access and backbone networks. In addition, due to the potential for cross-sector sharing of corridors, many corridors which are controlled by one infrastructure owner are also used by other infrastructure owners. For example, a roads authority will often control both a road reserve and the roadway established in the road reserve. With permission from the roads authority, other infrastructure owners may construct or install additional improvements and fixtures within the road reserve. These include water, sewer and gas utilities which may have buried their pipes along or under the road and installed access shafts and manholes in or along the road. They also include electric utilities which have buried ducts for their power lines under or along the road and/or installed poles or towers for overhead electricity lines within the road reserve. Where these layers of separately owned and operated

infrastructure exist, cross-sector sharing with the telecommunications sector may require separate formal sharing relationships between a telecommunications operator and each separate owner of infrastructure as well as the controller of the corridor. A broadband operator wishing to hang fiber optic cable on electric utility poles, for example, may need to obtain permission from the roads authority to locate its cables and equipment within the road reserve and permission from the electric utility to attach the cables and equipment to the utility's poles.

Sharing of corridors and other infrastructure reduces unnecessary duplication and costs and speeds up deployment. This creates greater efficiencies for the sharing parties, including both the telecommunications operator and the infrastructure owners. Infrastructure sharing also benefits the greater public and the environment. By reducing the frequency, scope and duplication of civil works projects, infrastructure sharing can reduce the proliferation of dedicated corridors, which exclude or limit other uses of land, as well as related improvements and fixtures, which create congestion within those corridors and may adversely impact the enjoyment of adjoining land. By reducing the number and scope of such projects, infrastructure sharing mitigates potential disruption or displacement of economic and social activities (by, for example, disrupting vehicle traffic), population relocation or displacement, health and safety risks, and negative environmental impact.

Utility Corridor

Repeated digging causes disruptions and leads to serious implications on the other infrastructure present in the area. A key measure taken by governments across the world is the development of a utility

corridor in conjunction with laying new roads and widening some as well. Multiple utilities, such as electricity, water, etc., use these corridors, thus significantly reducing the need to dig. A utility corridor is a tunnel or passage that is built either under or over the ground which may be used by multiple utilities, such as electricity, water, etc. It serves the purpose of preventing repeated digs, which in turn reduce the cost of roll-outs and deployments.

- For the establishment of Utility Corridors, players such as NHAI may be asked to provide ducting for all new road projects. Specific standards must be laid out by the Government in concurrence with NHAI, State Highway, piped natural gas, water, sewage and electricity as well, and these must be enforced with penalties for non-compliance.
- Utility corridors must be established along the medians of major roads and avenues, as these constructions will allow for minimal disruptions during road-widening and construction activities.
- Progressively, municipal corporations and municipalities could be asked to build these across major roads inside city limits thereby easing out urban broadband needs for infrastructure
- Policy must be laid down to secure fiber network by defining guidelines such as 'call before you dig' Construction of utility corridors in cities may be conducted through a 4-step process:

1. Information collection:

Information on existing infrastructure projects, deployed utilities and standards & design guidelines followed by existing deployed infrastructure providers will be gathered in this step.

2. Conceptual design development:

A conceptual design needs to be created taking into consideration the planning and transportation requirements. This effort has to be conducted between the planners, transport engineers and utilities engineers to enable agreement on an optimized design of the roads and utilities that will meet the requirements of the intended use of the development.

3. Evaluation of design:

At this stage the competent authority from the local government will select from the conceptual designs presented which are in line with RoW policies, road plans and so on. Changes, if any are asked to be made at this stage.

4. Final approvals:

Final approvals may be given after design finalization. At this stage, all NoCs may be given to the utility tunnel contractor/designer through a facilitated single window process.

Q.16: Whether voluntary joint trenching or coordinated trenching is feasible in India? If yes, is any policy or regulatory support required for reaping the benefits of voluntary joint trenching and coordinated trenching? Please provide the complete details.

Comments : Mentioned above.

Q.17: Is it advisable to lay ducts for OFC networks from coordination, commercial agreement, and maintenance point of view along with any other utility networks being constructed?

Comments :

Mentioned in the comments.

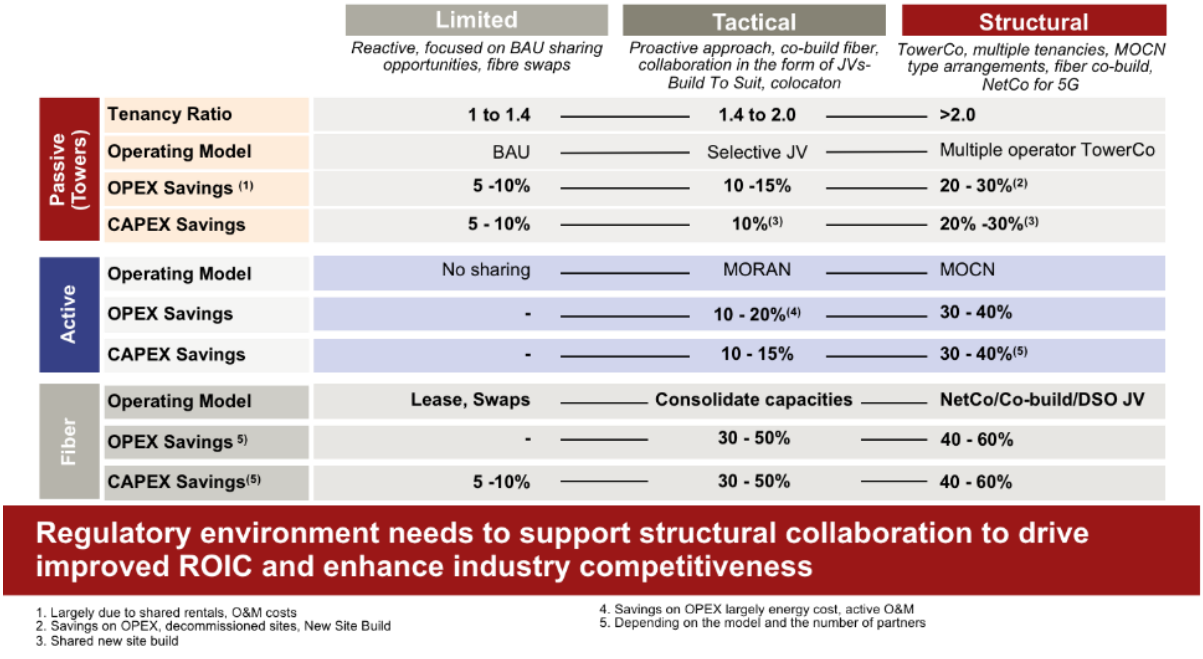
Q.18: What kind of policy or regulatory support is required to facilitate cross-sector infrastructure sharing? If yes, kindly provide the necessary details.

Comments :

Globally, the provision and operation of towers and associated infrastructure for telecommunications services is dominated by telecommunications operators. Operators typically own and operate their own towers, often outsourcing or contracting their construction to meet their own commercial and operational needs.

Asia-Pacific markets including India, Indonesia, Malaysia, Vietnam etc are seeing the emergence of separate tower companies. Competition between operators and tower co makes it more likely that capital will be available for infrastructure investment and that the market for tower services will be competitive. Tower companies have an incentive to host the equipment of as many operators as will maximize their profits. Operators, on the other hand, may have an incentive to block other operators in order to maximize market share and ensure that the quality of their services are competitive with, in relative terms, other operators.

Potential benefits based on scope of sharing :



Source : AT Kearney, 2019.

Policy which mandates tower sharing for all tower infrastructure has the potential to improve competition and accelerate service rollout. Such policy needs to be approached carefully, however, since it may also create disincentives to operators to invest in tower infrastructure.

It is important to note that, in relation to mobile networks, infrastructure sharing is mostly based on commercial agreements rather than on a specific regulatory mandate.

The TRAI should focus on the various ways in which authorities can encourage passive infrastructure sharing for the facilitation of network rollout. This includes allowing or mandating the sharing of infrastructure by mobile operators, as well as the promotion of independent tower companies, which may provide the whole or a substantial proportion of network infrastructure. In some cases, the entry of independent tower

companies will require amendments to the existing licensing framework. Regulatory measures to promote passive mobile sharing include:

1. Optional sharing:

In many cases operators will voluntarily opt to share infrastructure in order to reduce costs. This is a less interventionist approach than mandatory sharing (discussed below). Self- regulatory bodies such as operator associations may encourage sharing through the establishment of uniform conditions for site sharing, as well as communicating with government authorities. The government must provide guidance on the types of sharing allowed, and may encourage sharing by allowing access to state-owned facilities, as well as providing financial incentives for sharing such as tax concessions.

2. Mandatory sharing:

Operators are required to share sites or facilities on request. This should be implemented with clear policy objectives in mind, for example certain geographic or population coverage targets or addressing competition issues. The authority needs to develop criteria for determining those facilities subject to sharing, the setting of tariffs and other conditions, access to technical site information and conditions for the negotiation of sharing agreements between operators (e.g. time limits).

3. Dispute resolution mechanisms:

The TRAI may provide independent dispute resolution bodies to arbitrate on issues relating to access negotiations or agreements. The body must be independent of any interested parties.

4. **Continued:**

• **Licensing conditions and local authorities:**

In some states the installation of masts and towers may dealt with by local authorities, which require permits for the construction of various mobile infrastructure. It may be possible for TRAI to develop rules or guidelines to be followed by local authorities to ensure the efficient rollout of infrastructure and to minimize disputes between operators/tower providers and local authorities.

Site sharing agreements between operators may be unilateral, bilateral or multilateral. They may be concern an individual site or provide a framework for multiple sites or all sites in a geographic region. Site sharing agreements do not generally restrict competition as operators retain independent control of their respective networks and services. However, TRAI should ensure such agreements do not include exclusivity clauses, and leases should allow other operators to place equipment on the site without requiring further consent from the real estate owner.

Q.19: In what other ways the existing assets of the broadcasting and power sector could be leveraged to improve connectivity, affordability, and sustainability.

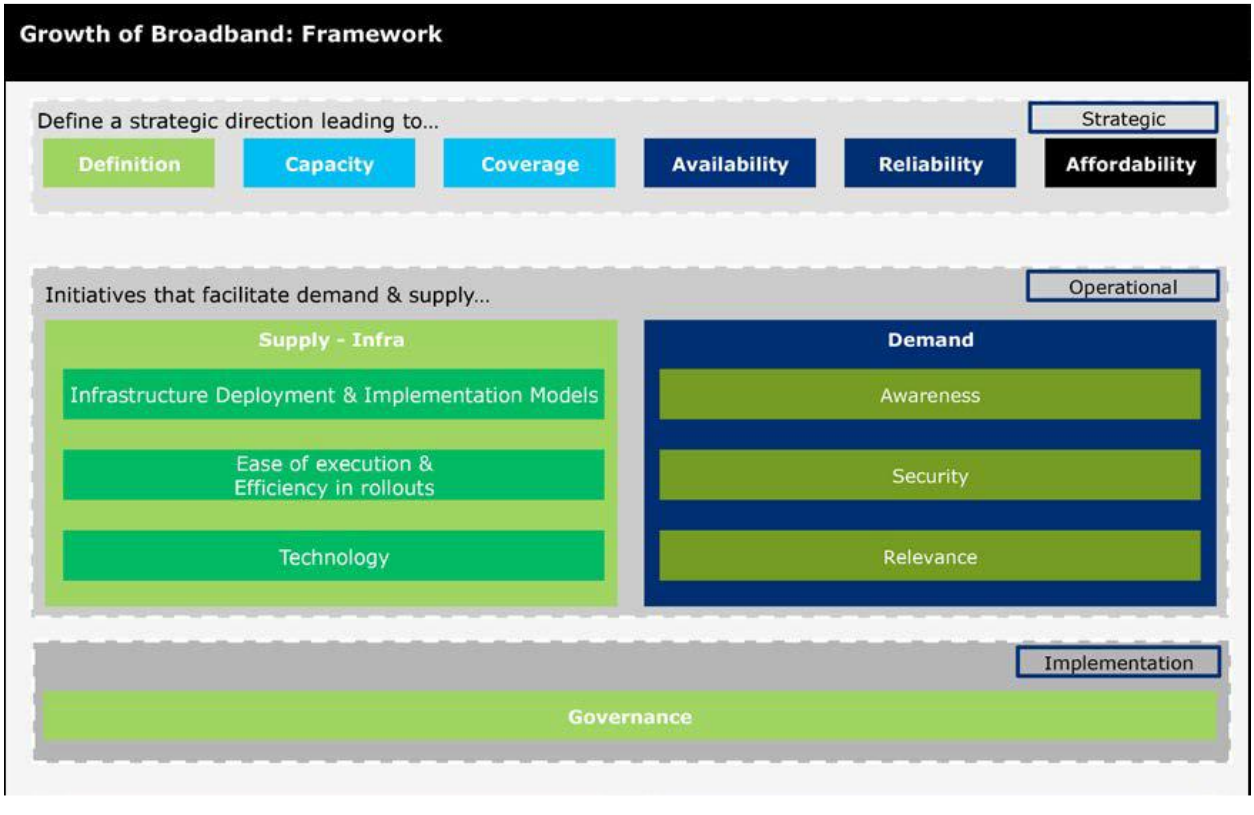
Comments :

It is important to define a **strategic** direction for broadband in the country. This would include an aspirational goal of the **definition** of minimum speeds of broadband along with setting **capacity and coverage targets,** and the ambition to maintain certain minimum levels of **availability, reliability and affordability.**

Initiatives and actions need to be taken comprehensively, from both supply (infrastructure) and demand side, thereby covering the entire

broadband ecosystem. Infrastructure initiatives would include deploying the most optimal infrastructure and implementation models, defining guidelines and regulations to facilitate **ease of execution** and **efficiency in roll-outs,** and defining the **technology** considerations. In order to foster demand for broadband services, actions would need to be taken to ensure **awareness, security** and **relevance**. Further, the success of the plan and identified initiatives would depend upon establishing a strong **governance** model.

Key considerations and recommendations for India along the defined framework are mentioned in the forthcoming sections.



FTTx deployments are gaining traction across the world fueled by the growing demand for data. While incumbent service providers are actively deploying fiber for internet access, new players are also participating in FTTx deployments. Real estate developers are among the new entrants that

are actively leading FTTx deployments. These developers typically build large housing developments, apartment complexes and office premises. An emerging model of FTTx deployment is one where real estate developers are partnering with telcos and ISPs to roll out FTTx. The real estate developers usually have the Rights of Way (RoW) within their development area, while access providers provide fiber and access services to end users. The real estate developers provide manholes and carry out the ducting exercise, and the service providers provide fiber connectivity through these ducts to end users in the buildings.

Q.20: For efficient market operations, is there a need of e-marketplace supported by GIS platform for sharing, leasing, and trading of Duct space, Dark Fiber, and Mobile Towers? If yes, then who should establish, operate, and maintain the same? Also, provide the details of suitable business model for establishment, operations, and maintenance of the same. If no, then provide the alternate solution for making passive infrastructure market efficient.

Comments : Yes.

Q.21: Even though mobile broadband services are easily available and accessible, what could be the probable reasons that approximately 40% of total mobile subscribers do not access data services? Kindly suggest the policy and regulatory measures, which could facilitate increase in mobile broadband penetration.

Comments :

The possibility of many of radical changes in both the social and business realms will, of course, entirely rely on the pace at which India goes broadband. Despite the rapid expansion in mobile internet, data originating from mobile devices still account for only 20% of India's data consumption. That is why what happens in the wired broadband space will matter increasingly.

- The logic is simple: unlike mobile towers, fiber needs to reach each home physically. China's broadband boom happened because it has rebuilt nearly its entire housing stock in the last 15 years, fuelled by a construction-led growth bubble. "In India, initially only all the upcoming new buildings may get connected to fiber-based (fast) internet,"
- According to a recent UNICEF report, only 29% of India's current internet users are women. If the cost of wired broadband begins to crash-thereby increasing the number of home which have access- women who will never get access to a phone due to the cost of device and patriarchy will finally be able to see things on the internet. The negotiation should be sought out.
- The Governments would have an important role in ensuring women get to use the internet "on terms that are empowering". "We can think of innovative models when fixed broadband becomes cheap.

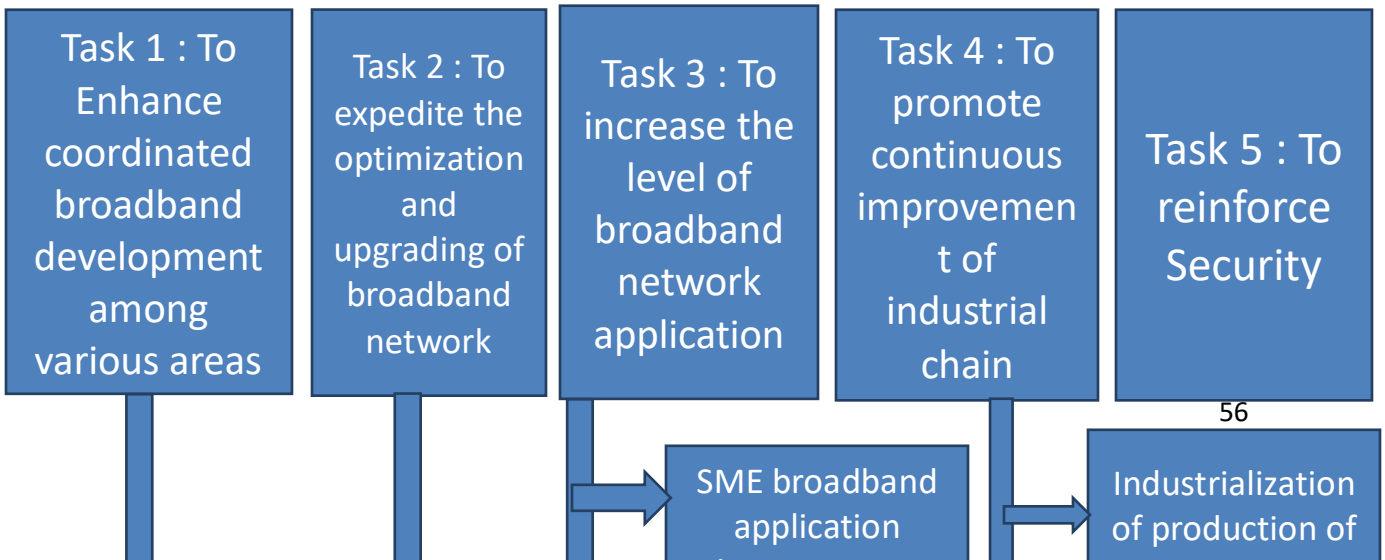
- The household is not the space for this. It can be libraries which have special times for young girls or digital labs for women.
- We need to rethink the missed opportunity of the BharatNet and the National optic fiber network. Internet access should not stop at just the Panchayat office. We must think of different points of access, particularly for women,"

Policy Paralysis :

- Fiber is expensive to lay, unlike a SIM card which can be given away for free.
- India till a few years ago was mostly a voice calls market and not a data market.
- Municipalities in India have complicated right-of-way (RoW) procedures which act as a big hurdle for digging and laying fiber. This is one of the reasons why even government (such as the Delhi government) plans to set up citywide surveillance and Wi-Fi hotspots have failed.
- "The centre has finally issued a very good RoW model, but now every state has to come up with its own policy modeled on the central guidelines. They are taking their own sweet time.
- The lack of forward movement on these fixable policy issues assumes significance given the government's focus on fiber in its National Digital Communications Policy-2018.

- The sad reality is that the last five years were an absolute failure in laying fiber in the country. Bharat Net, the flagship mission to connect 250,000 g
- Gram Panchayats with broadband, which was being implemented by Bharat Broadband Network Ltd (BBNL), a special purpose vehicle set up under the department of telecommunications (DoT) in February 2012, has been a disappointment, to say the least.
- The government has completed laying optical fiber cables across more than 100,000 gram panchayats in the first phase and had aimed to complete connecting the remaining 150,000 councils by March 2019. The second phase of the Government's ambitious BharatNet project is also lagging way behind the schedule after a delay in phase one of its implementation. Against a target of providing connectivity to 1.5 lakh gram panchayats, just about 7.45% of the goal has been achieved so far.
- To start with, the DoT plans to monetize fiber assets built by the government under its flagship mission BharatNet through outright sale to private players or by leasing these assets for a 20-year period after a bidding process. If successful, it could boost connectivity in Indian villages, which have so far been kept out of the digital dividend.
- Big players are stressed for funds and are diluting their non-core assets to generate funds to keep networks afloat.

- India has one of the costliest spectrums in the world. The internet service providers are already cash-strapped with cut throat competition and low cost of internet. In such a situation, the companies are not being able invest in buying spectrum and this coupled with the ever-growing internet users, where limited available bandwidth is being distributed among increasing number of users, are the reasons the speed is slowing down.
- The other programmes of the Ministry under Digital India include Universal Access to Mobile Connectivity, Public Internet Access, e-governance and e-Kranti which focuses on electronic delivery of services whether it is education, health, agriculture, justice and financial inclusion.
- However, telecom experts say that unless the bandwidth speed is increased and spectrum prices are brought down, these programmes which are already running behind schedule are not likely to see the light of the day.
- A long term goals should be designed by taking in to account the needs of India's future development.
- There should be five key tasks along with major projects like :



Policies and Measures :

1. Organizing structure and leadership
2. System environment
3. Broadband network construction
4. Broadband construction in Rural and Tribal areas
5. Resource protection and international cooperation

Address the key rural coverage challenges :

(1) Tower :
- (i) Decrease the cost of implementation with smart sites.
- (ii) SW based solutions for easy capacity upgrade and remote maintenance via centralized NOC.
- (iii) Fight the theft with host based operational set-ups.

(2) Power :
- (i) Explore opportunities for site sharing.
- (ii) Autonomous sites with renewable energy alternatives.

(3) Backhaul : Optimize backhaul with integrated IP/Ethernet functionality.

Affordability is mainly impacted by the network and device :

(i) Network operator :
- (a) Efficient Network
- (b) Efficient Operation

(ii) Consumers :
- (a) Device cost
- (b) Service cost
- (c) Tax
- (d) Consumer pattern Ex. Village Phone, Village franchise.

Challenges :

Some key challenges in the expansion of Broadband infrastructure in India are as follow :

1. Low investment in fiber
2. Traceability and usability of existing fiber :

   Poor health of existing fiber due to fiber cut is magnified due to absence of GIS maps for tracing and correcting cable faults in the deployed dark fiber.
3. Lack of reliability of fiber :

   The existing network topology of the fiber from block to GP is largely linear, which is inadequate for providing network redundancy. Connectivity may be lost in events of link failures due to lack of alternate routes for routing traffic which is available in ring architecture. Hence, there is a risk of non availability of backhaul network and lower than acceptable service levels to telecom operators and end users.

Q.22: Even though fixed broadband services are more reliable and capable of delivering higher speeds, why its subscription rate is so poor in India?

Comments :

Broadband should be a National strategy instead of single action being undertaken by the Telecommunication department and TRAI.

There should be three considerations :

(1) Serving for national economy and social development

(2) Treating construction of Next Generation information infrastructure as a goal and pushing forward collaborative development between broadband and industry.

(3) Seeing from angle of the overall situation, planning and coordinating broadband as a whole and intensifying top design and layout.

There are still some problems with broadband network as a main carrier of information such as :

(i) Unclear positioning of public infrastructure

(ii) The development imbalance between different regions and between urban and rural areas.

(iii) An insufficient number of application services.

(iv) The lack of technical originality

(v) Absence of an ideal environment.

(vi) A long term goals should be designed by taking in to account the needs of India's future development.

The implementation of the Broadband strategy should fundamentally address all these above weaknesses.

(v) The causes for the slower growth of Broadband in India can be attributed to high cost of Personal Computers and Internet access, poor telecom and internet infrastructure, limited digital content in local languages, slow growth of e-commerce, lack of e-governance initiatives by the Government etc.

The Indian Computer market continues to be protected with restrictions on import of used and low Cost PCs. The domestic market still relies on the imported hardware and components making the overall cost of PCs over Rs.15,000/-, making it expensive for an average household. Though the Government had brought down the Customs duty on computer hardware, high local taxes make the PC expensive. With the introduction of compulsory Computer Education at the schooling level, there is a clear case for the Government to introduce zero tax on PCs purchased by the household. Also, concessions in the form of tax holiday must be given to the SOHO and SME segment for investments in office automation.

Q.23: What could be the factors attributable to the slower growth of FTTH subscribers in India? What policy measures should be taken to improve availability and affordability of fixed broadband services? Justify your comments.

Comments :

There should be two national standards to have a growth of FTTH subscribers in India :

(i) Code for design of communication engineering for Fiber to Home in residential areas and residential buildings

(ii) Code for construction and acceptance of communications engineering for fiber to home in residential areas and buildings.

The issuance and implementation of these two national FTTH standards provide technical foundation and construction basis for FTTH

projects in residential districts and buildings, which are the important basis for solving the difficulties in residential broadband construction, push forward the full realization of FTTH for residential buildings as well as promote the co-construction and sharing of communications facilities in residential communities, and of great importance for implementing the Broadband penetration in India.

The exclusion of infrastructure players from the coverage of the new RoW policy is a major challenge, as in India most of the 450,000+ towers are owned by independent tower companies, which do not enjoy the benefits of the new RoW policy. Hence, pace of deploying FTTT and new mobile towers may remain slow and lop-sided.

Q.24: What is holding back Local Cable Operators (LCOs) from providing broadband services? Please suggest the policy and regulatory measures that could facilitate use of existing HFC networks for delivery of fixed broadband services.

Comments :

Cable is a powerful source for broadband delivery that has not been tapped adequately in our country. However, strangely enough, cable is the medium that is making one gigabytes per second (gbps) speed wired broadband connectivity a reality in India. There have been efforts by some multiple-system operators to provide broadband that are gathering steam, and now that they are seeing this as a fast-growing and profitable area.

In India, cable TV industry now connects over 100 million households. It has tremendous reach, deep into urban and rural areas with last-mile access in over 100 million homes and over 1500 towns. Majority of homes

are reached by MSOs via fixed line coaxial cable, which can be quickly upgraded to carry high-speed broadband.

However, there are some issues :

1. The unstructured aerial cable method, while cheap, quick and adequate, could pose problems in bad weather and it is better to have permission from municipalities or discoms to lay aerial cable over electricity poles.
2. Despite gazette notification by the Government, the Right of Way (RoW) and inexpensive digging permissions for underground ducting and fibre deployment, are yet to be fully implemented by the local bodies and State governments.
3. For accelerated growth of cable broadband, a harmonized effort is required by the industry, policy makers, regulators and other stakeholders. Local bodies need to be encouraged to set up common ducting where a large fiber bundle can be deployed that can be leased by them to all users, particularly data providers — cable, telco and ISP.
4. This circumvents the RoW issue and ensures that everyone will benefit from this infrastructure sharing. Shared common telecom infrastructure (CTI) is also the best available option for proliferating cable broadband in rural areas. An MSO or an LCO (local cable operator) has to apply for a license to provide broadband services over cable or fiber. There are various categories of service authorization-wise requirements and fees, which range from ₹2 lakh (for district-level ISPs) to ₹15 crore (for all-services players).

5. Though these license fees may not appear too high as compared to telco license fees, they are still too prohibitive for cable operators who are small entrepreneurs, used to working with low capex and opex with low returns. Creating entry barriers viz. compulsory high license fees to provide an essential service is perhaps counter-productive.

6. Integrated offerings in the convergent domain of broadcasting and broadband can be provided by LCOs and MSOs to maximize the benefits for all and reduce the cost to the end consumer.

7. This needs to be facilitated by a convergent or unified regulatory framework. MSOs who provide cable broadband generally have the ISP license and hence the DoT gazette notification issued on November 18, 2016 on Right of Way, applies to them automatically and they merely need to leverage this for rollout.

8. For MSOs and LCOs who do not have an ISP license, suitable amendment to the gazette notification should be issued, for including them as the beneficiary of the new ROW rules also.

9. Government needs to actively promote the concept of enabling broadband over cable by conducting nationwide awareness and skill development programmes amongst LCOs and also actively promote wi-fi and other services on cable that will enhance operator revenues and additional bouquet of new services to consumers at a cost effective price and also increase government's revenues.

10. Because of its affordability and ubiquity, cable broadband could be, for India, a super-fast highway for broadband communications for most homes and businesses in the foreseeable future. It is, possibly,

the single biggest existing and scalable infrastructure which can witness exponential growth in the coming years.

Q.25: When many developing countries are using FWA technology for provisioning of fixed broadband, why this technology has not become popular in India? Please suggest the policy and regulatory measures that could facilitate the use of FWA technology for delivery of fixed broadband services in India.

Comments :

Wireless technologies faces many challenges to provide broadband access services.

1) Radio signal propagation is affected by the weather and geographical environments.
2) Resources are insufficient in busy hours
3) Technical solutions needs continuously improve coverage experience and capacity

Q.26: What could be the probable reasons for slower fixed broadband speeds, which largely depend upon the core networks only? Is it due to the core network design and capacity? Please provide the complete details.

Comments :

Multiple factors affect the speed and quality of the internet connection. Transfer technology, location, the number of people share the connection with and the device you used are some of these factors.

1. Data transfer technology. In fixed networks, the main factor affecting the broadband speed is the technology used for data transfer. Fibre-optic and cable networks enable high-speed connections, whereas traditional xDSL connections provided over a telephone network have limited maximum transfer speeds.

2. Network centralizer. The speed of your connection also depends on the distance between the terminal device and the network centralizer. The further the customer live from the operator's broadband centralizer, the more it affects the speed of your connection.

3. Other devices and users. Most of us have several different devices connected to the internet at the same time at home. If customer uses multiple services and customer is not the only user of the network, this can cause the connection to slow down or cut out.

4. The telecommunication infrastructure is under immense pressure as millions of people in the country are staying indoors due to the Covid-19. This has also resulted in more people working from home, and even schools and colleges have moved to an online model for classes, thus increasing pressure on the networks.

5. The slow bandwidth speed is also one of the cause of slow speed.

6. The growing number of telecom users is also cited as one of the reasons for slow speed

Q.27: Is there a need of any policy or regulatory intervention by way of mandating certain checks relating to contention ratio, latency, and bandwidth utilization in the core network? If yes, please suggest the details. If no, then specify the reasons and other ways to increase the performance of the core networks.

Comments : No comment.

Q.28: Should it be mandated for TSPs and ISPs to declare, actual contention ratio, latency, and bandwidth utilization achieved in their core networks during the previous month, while to their customers while communicating with them or offering tariff plans? If no, state the reasons.

Comments : Yes.

Q.29: What could be the probable reasons for slower mobile broadband speeds in India, especially when the underlying technology and equipment being used for mobile networks are similar across the world? Is it due to the RAN design and capacity? Please provide the complete details.

Comments :

1. Smart phones have redefined the way we use the internet. As a result, there is a huge spike in data demand. Earlier users were restricted to

1GB of data every day, now this limit has grown manifold. Of course, the users are getting more data to consume, but without the fast speeds. The fact is that telecom operators are not able to meet this high consumer demand. In other words, networks are overloaded, and this, in turn, impacts the speeds.

2. The investment in rural connectivity might be one reason that the average broadband speeds we've seen across India's states and union territories don't seem to correlate to population density.

3. Fluctuating network speed.

4. Faults At The Telephone Exchange

   There may be a problem or fault with the equipment or wiring in the local telephone exchange or street cabinet. Some exchanges and cabinets in more rural areas are also operating with older equipment and wiring that is not capable of supplying faster speeds.

5. Telephone Line Faults

   The telephone line that provides the phone and internet connection to the home may be damaged or have a fault on it. This could be on the line between the exchange and the street cabinet, or between the street cabinet and your home.

6. Homes Distance To The Local Telephone Exchange

   If the broadband is supplied over a traditional copper phone line from a provider like then it is highly likely that the further

customer live from their local telephone exchange the slower the broadband speed will be.

Even if customer have fiber optic broadband from these providers, this may only be fiber from the exchange to the local cabinet, with the traditional copper wire used from the cabinet to the home. As such, a possible speed of up to 38Mbps may not be achieved.

7. Interference On Telephone Extension Leads

If customer is not plugging his broadband router directly into the main phone socket in his home then it is likely that the broadband speeds are being reduced by interference on the telephone extension leads you are using. Flattened under the carpet, tangled or coiled extension leads can make matters worse.

8. Traffic Management Policies

Some broadband providers reduce or 'throttle' broadband speeds at peak times of the day as their equipment is reaching capacity. This is often referred to as their 'Traffic Management Policy' in their terms and conditions.

Q.30: Is there a need of any policy or regulatory intervention by way of mandating certain checks relating to RAN user plane congestion? What should be such checks? If yes, then suggest the details, including the parameters and their values. If no, then specify the reasons and other ways to increase performance of RANs.

Comments : No.

Q.31: Should it be mandated to TSPs to declare actual congestion, average across the LSA, recorded during the previous month over the air interface (e.g., LTE Uu), in the radio nodes (e.g., eNB) and/or over the backhaul interfaces between RAN and CN (e.g., S1-u), while reaching out to or enrolling a new customer? If so, then suggest some parameters which can objectively determine such congestions. If no, then specify the reasons and other ways to increase performance of the RAN.

Comments : Yes.

Q.32: Is there a need of any policy or regulatory intervention by way of mandating certain checks relating to consumer devices? If yes, then please suggest such checks. If no, then please state the reasons.

Comments : No.

Q.33: To improve the consumer experience, should minimum standards for consumer devices available in the open market be specified? Will any such policy or regulatory intervention have potential of affecting affordability or accessibility or both for consumers? Please justify your comments.

Comments : Yes.

Standards provide consumers with confidence in the quality and safety of products and services. In doing all of this, Standards impact communities and economies across the globe. It helps by:

1. Reducing Costs :

Lowering costs through minimizing errors, redundancies and increasing productivity.

2. **Efficiency**

Improving quality, safety, and lead-time of products and services.

3. **Mitigating Risks**

Identifying and mitigating risks within their business and supply chain.

4. **Consistency**

Lowering research and development costs and improving speed to market by building on previously standardized technology or systems.

5. **Customer Confidence**

Promoting acceptance of product or services into the marketplace by increasing customer confidence in their safety and quality.

6. **Uniformity**

Providing uniformity of units of measurement, enabling accuracy and confidence in commercial transactions locally and globally.

7. **Eliminate Trade Borders**

Helping products, services and staff move across trade borders, reducing technical barriers to international trade.

8. **Universal Vendor Requirements**

Improving supply chain management by establishing common requirements for all vendors to comply with.

(Dr. Kashyapnath)
President