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Dated: 09.11.2020

To,
Shri Sunil Kumar Singhal,
Advisor (Broadband & Policy Analysis),
Telecom Regulatory Authority of India,
Mahanagar Door Sanchar Bhawan,
Jawahar Lal Nehru Marg,
New Delhi – 110002.

Sub: Response to consultation Paper on "Roadmap to Promote Broadband Connectivity and Enhanced Broadband Speed"

Dear Sir,

This is with reference to your above mentioned consultation paper. In this regard, please find enclosed our response for your kind consideration.

Thanking You,
Yours' Sincerely,
For **Bharti Airtel Limited**

Rahul Vatts
Chief Regulatory Officer

Encl: a.a.

Response to TRAI's Consultation Paper on Roadmap to Promote Broadband Connectivity and Enhanced Broadband Speed

At the outset, we would like to thank the Authority for providing us an opportunity to express our views on the TRAI's consultation paper on 'Roadmap to Promote Broadband Connectivity and Enhanced Broadband Speed'.

Broadband connectivity has become a basic necessity and a prerequisite for achieving the vision of Digital India. Although most of the country's population is now covered with mobile broadband networks, the penetration of fixed broadband remains abysmally poor. There are certain inherent limitations of mobile broadband, and Fixed broadband is required to enable seamless access to various Digital Services, like e-education and remote work from Home.

Therefore, countries around the world have focussed extensively on the availability of fixed broadband. However, Broadband penetration in India has been predominantly driven through mobile broadband, with very poor fixed broadband availability. As per the 2018 report of World Bank, Fixed Broadband subscription (per 100 people) in India was around 1.34. On the other hand, France had 44.78, Australia had 30.69, and Vietnam had 13.6 fixed broadband subscriptions per 100 people. Due to a shortage of fixed broadband and over-reliance on mobile networks and their heavy usage, **India's average mobile broadband** speed is around only 10.15 Mbps, which i**s only a third of the global average**. **India is ranked 130th among 176 countries** in terms of **average mobile Internet download speeds in 2019.**

In respect of Mobile broadband, India has registered more than 625 million broadband users, with approximately 97% of the subscribers as wireless broadband subscribers. With the growing demand for internet usage and smartphone adoption, the country is expected to add additional 410 million smartphone users by 2025. The capacity of wireless networks is directly correlated with the quantum of the spectrum being made available.

The poor availability of broadband in India can be largely attributed to an unviable business model. The Authority in Para 4.5 of the consultation paper has recognized telecom being a capital-intensive sector, and that creation of telecom infrastructure will require significant investments, a major part of which will come from the private sector. However, the consultation paper has not addressed this issued in detail. We believe that this is the most important aspect for the proliferation of fixed broadband, further improvement in wireless broadband, and a 5G network deployment in the coming future. Immediate measures are required to ensure an increase in the industry's revenue and reduce their costs.

In this reference, the following measures need to be taken immediately to ensure swift proliferation of broadband services :

- **Introduction of Floor Tariffs:**
  Given the extremely competitive nature of the market, we need an unprecedented intervention. The only way to realize the orderly conduct, for now, is through the fixation of floor tariffs for a time-bound period. This will go a long way to restore the financial health, allow for the massive investments needed, and enable broadband for all.

- **Reduction in Levies and Taxes:**
  The levies and taxes in India on the Indian telecom sector are one other highest in the world. There is an urgent need for the License Fees, Spectrum Usage Charges, and GST to be reduced considerably to allow the operators to have additional funds that can be ploughed back in the network.

- **Definition of Gross Revenue/ Adjusted Gross Revenue:**
  DoT must revisit the definition of Gross Revenue and Adjusted Gross Revenue. The new definition should be fair, rational, proportionate, and based on global industry best practices. It should include only telecom revenues.

- **Rationalization of Spectrum prices – both access and backhaul spectrum:**
  Instead of setting very high reserve prices, the spectrum price should be rationalized and lowered. Reasonable spectrum payouts will incentivize the operators to buy more spectrum rather than rely on network densification to meet the growing customer demand. To cater to the access network's capacity, the assignment of adequate microwave carriers, including spectrum in the E & V band at a reasonable price, be done to meet the requirements of backhaul. The above provisions will result in lesser interference and better speed & quality.

- **Right of Way (RoW) permissions:**
  There should be a single window for RoW permissions for laying fiber and installation of the tower. The RoW charges should not be exorbitant and should be commensurate only with the restoration charges to ensure the viability and affordability of services.

- **Reasonable Traffic Management Practices:**
  Presently, voice, SMS, and data are the bearer services provided by the TSPs. To enable other monetization opportunities, the operators should be allowed to do reasonable traffic management practices to ensure a differentiated experience to the customers.

An increase in revenue and a decrease in costs will go a long way in making a viable business case and an inflow of investments in the sector.

It is important to take a concerted policy about the above issues to enhance India's broadband connectivity. We hope that the Authority will duly consider these issues. With this backdrop, our responses to the issues raised in the Consultation Paper are as below:

Q1. 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.

&

Q2. If you believe that the existing definition of broadband should not be reviewed, then also justify your comments.

Bharti Airtel's Response:

The present definition of broadband as notified by DoT is as below:

> *"Broadband is a data connection that is able to support interactive services including Internet access and has the capability of the minimum download speed of 512 kbps to an individual subscriber from the point of presence (POP) of the service provider intending to provide Broadband service."*

We believe that any changes to the existing broadband definition should be based on the following considerations:

- **Type of services being accessed by the Consumers:** Broadband connectivity is being used for accessing various services viz. website browsing, downloading files, audio content, video content, streaming services, video conferencing, etc. The definition should take into consideration the essential consumer requirements.

- **Comparable with Global norms:** Any change in the broadband definition should be in sync with that adopted globally and does not take India lower in the broadband index when compared to other countries, which are following standard of >256Kbps as the broadband definition

- **Optimal Utilization of existing Infrastructure:** Take into consideration telecom infrastructure available in India to have a pragmatic definition of broadband speeds to ensure optimal resource utilization and affordability.

- **Priority towards availability and affordability:** With the present penetration of 7.6 per 100 households, the priority should be to enable broadband access to all households. The definition should therefore foster India to have a higher number of homes/ building connected on broadband rather than just the speed of broadband.

With the above context, it is evident that with the existing definition defining the minimum download speed of 512 Kbps;

- The customer can access various services viz. website browsing, downloading files, audio content, video content, streaming services, video conferencing, etc.
- Is comparable with the global norms
- Allows for optimum utilization of the existing infrastructure considering the diversity of last-mile access, including Copper cable, Cat5 cable, optical fiber, coaxial cable, wireless access, etc.

With the dismal status of fixed-line broadband infrastructure, the first and foremost focus should be to enhance broadband availability and affordability via various available media. With this perspective, **the existing definition of broadband is working fine and should be continued with** for the next few years till the broadband infrastructure becomes omnipresent.

In future, say after the next 2 years, once the availability and affordability have been taken care of, we may look to have the following changes in the broadband definition for enhanced customer experience:

- **Mobile Broadband:** It's an acknowledged fact that ensuring the delivery of minimum download speed in the last mile connectivity is not feasible in mobile broadband due to shared access medium. Globally, 3G and 4G are being considered as broadband. But considering that the operators in India are in the process of shutting down 3G networks and having a forward-looking definition in the future, we recommend that for **Mobile broadband, any connection that is 4G or beyond should be treated as broadband.**

- **Fixed broadband:** It is technologically possible to ensure guaranteed minimum speed in wired/ fixed broadband. Considering the enhanced requirements in fixed broadband, we recommend that in the future, **broadband may be defined by speeds higher than 8 Mbps for fixed broadband.**

In view of the above, revised **definition of broadband proposed for the future, once availability becomes a norm**, is as below:

- *"**Mobile broadband** is any broadband access provided by fourth-generation mobile access technology i.e. 4G/LTE/ LTE-A and higher speed mobile technologies (5G).*
- ***Fixed broadband** is a data connection that is able to support interactive services including Internet Access and has the capability of the minimum download speed of 8 Mbps to an individual subscriber from the point of presence (POP) of the service provider intending to provide Broadband services "*

Q3. 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.

Bharti Airtel's Response:

India should focus on broadband penetration to more households, offices, enterprises, and buildings rather than the broadband connection capacity. This would help in broadening digital connect for end customers. Throughput speed of >512 Kbps on broadband connection is sufficient to carry all data services, including video conferencing, e-commerce, digital financial services, and any other peer to peer services.

An equivalent example for the same would be from the road network, where our focus has been on widening the road infrastructure and then working on increasing the maximum speed that can be allowed on these roads. Currently, India has lower maximum speeds on the roads and more focus is on taking mortar road network to rural India. Similar equivalence can be derived from the energy sector, where the focus is on rural India's electrification without calling out the type of connection per household, say 2KW / 5KW / 10KW.

Q4. 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.

Bharti Airtel's Response:

Broadband speeds are dependent on many factors such as the location of the user, type and capability of the user terminal (smartphone, Wi-Fi router etc.), type of application, concurrency of the users in a given area, time of the day, event in the given location, etc. These factors have also been recognized in the consultation paper.

Given these factors, it is not recommended to have a speed measurement program that would create logistics & reporting overheads for the service providers and generate ambiguity and disparity in reporting across service providers. It would also add to the confusion for the end customers.

TRAI's MySpeed app also gives speed measurement statistics to the customers and is a speed measurement platform like other apps. We believe that suitable measures be taken to resolve the app's issues, as has been highlighted to the Authority vide letter dated 19.02.2018.

Further, there are sufficient speed test applications available to consumers to check their network speed. Such applications depict the experience/ speed consumer is witnessing and regularly publishing major service providers' overall network experience.
Therefore, we believe that **the current mechanism wherein service providers' broadband speed is defined by service providers should be sufficient to reconcile the country's broadband connections.**

Q5. 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.

Bharti Airtel's Response:

While, the RoW Rules, 2016 aimed at expediting the building of telecom infrastructure, but its implementation across States have not been on the expected lines and different State Governments continue to operate with their rules for granting RoW permissions with very high timeframes and disproportionately higher charges than the prescribed rates in RoW 2016 policy.

The procedure for obtaining RoW permissions, for laying fiber, towers, and other telecom infrastructure, is highly complicated and time-consuming as clearances are required from multiple Municipal & State Government authorities. There are no uniform policies, across states/ jurisdictions, for fiber deployment, which create chronic complications and become

a pretext for denial of permissions by some local bodies. In addition, related infrastructure like compact Roadside cabinets with Electricity connections is difficult to obtain in many states.

Even if RoW permissions are granted, **the exorbitant RoW fee is charged**, which varies across the States and **can go up to INR 10,000 per meter**, making the fiber deployment commercially unviable. The agony does not end here, as at some places, **additional charges** such as **land rate charges** (ranging from **Rupees 10000 to 100000 per square yard**), **lease/rental charges** up to 15 or 20 years on Underground cables, are imposed by some Authorities. As a result, **India remains a highly under-fiberized country** with close to 1/16th of China's fiber deployments.

One of the reasons for the slow implementation of RoW Act on the ground is the lack of its legal enforceability on the States and other Central and Government Ministries. The grant of RoW permissions is a multi-stakeholder issue. There are multiple authorities like Local Bodies, Railways, Roadways and Highways, Forest Departments, Electricity Distribution, transmission agencies, etc. which grants RoW permissions for laying OFC/erection of telecom infrastructure. Despite the passage of this Act for about four years, only a few States have come out with their own RoW rules, and even in such States, the enforceability of such rules is a huge challenge since different local bodies follow their own rules.

Furthermore, there is no explicit and uniform pricing model in place for RoW permissions. There is no well-defined compliance & grievance mechanism. RoW charges are still arbitrary, ad-hoc with huge variations from one Authority to another.

Therefore, to boost telecom infrastructure across the country, we suggest the following:

- **Creation of Council** – Goods & Services Tax Council (GST Council) is a constitutional body for making recommendations to the Union and State Government on issues related to Goods and Service Tax. The Union Finance Minister chairs the GST Council. Other members are the Union State Minister of Revenue or Finance and Ministers in-charge of Finance or Taxation of all the States. The Indian model of the GST Council is unique in the world and represents a paradigm of a partnership between central and state governments and between Government and industry. A GST type of Council should be created comprising members from Central, all State Governments/Union Territories, and other relevant stakeholders such as Railways, etc. This will ensure that all the States are on board in framing the policy related to RoW.

- **RoW Charges - The RoW Charges should be waived off or at least restricted to the cost of restoration** to accelerate fiber roll-out. Further, more cost-effective means of fiber deployment, such as aerial fiber should be permitted in near to medium term.

- **Smart City Projects -** Smart city projects to ensure multiple ducts / underground dark fiber with provision to lease and allow the use of public/private infrastructure to connect the last mile. Due to the telecom operators' experience in handling communication infrastructure, they should be preferred for smart city projects for faster rollouts.

- **Implementation of** RoW **2016 Rules by all States:** All the State Governments should implement Gazette notification on RoW and uniform policy on underground & overhead infrastructure at the earliest. Till date, only 16 State Governments have done this, and rest have either not come out with any policy or have policy inconsistent with Gazette notification.

- **The validity period of Permission:** RoW permission should be valid until the Licence's validity period or the Registration granted by DoT to the concerned operator.

- **Single Window Clearance:** All States should implement Single Window Clearance for all RoW permissions.

- **Deemed Approval:** The RoW approvals should be granted in a specific time frame of 14 days. If no approval/rejection is received, then the application should be deemed approved.

- **Aerial Fiber –** A Clear policy framework should be created for aerial fiber approval.

- **Change in construction design policy:** All infrastructure sectors such as road construction authorities/agencies like NHAI/SH/PP Projects should include, in their construction design policy, a provision for a utility duct to enable laying of OFC for all new infrastructure and also adopt similar measures in existing projects in a “Dig Only Once” policy approach. Road site permission for ODC (Outdoor Cabinet) with electricity supply should be allowed (like Madhya Pradesh, Bengaluru). Similarly, laying duct/ making trench should be part of Road construction specifications during any public utility work. Furthermore, laying /clamping of cables along Metro routes should be allowed.

- **Change in Building by-laws:** There is a need to change building by-laws that currently deem only electricity, water, and fire safety as a necessary infrastructure for the issuance of a completion certificate. All new buildings must have duct/trench inside the premises & shaft to lay fiber uptill the home.

- **Reasonable charges -** Rates and time limits for all terrains & territories should be pre-defined. Rates should be rationalized and conducive to the growth of fiber build across urban, rural & remote areas. Both Tariff and tariff structure should be made uniform across authorities & geographies. Arbitrary costs and rules concerning reinstatement cost must also be defined and made transparent.

- Other suggestions:
  - Measures should be taken to ensure the security of infrastructure and intentional damage to fiber/ infrastructure to be treated as a criminal offense.
  - The RoW policy should allow easy/unrestricted access to use the government infrastructure e.g., Electricity Poles/ BSNL poles for Overhead fiber/ splitters etc.
  - A standard guideline for the Usage of public utility for Optical fiber cable (Poles, Metro Pillars, Gas pipeline etc.) should be introduced.
  - Electricity distribution companies should allow the use of poles across India at a nominal rate of rupees 100 per annum (like Madhya Pradesh)

Q6. Is there any alternate way to address the issues relating to RoW? If yes, kindly elucidate.

&

Q7. 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.

&

Q8. 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.

&

Q9. What could be the most appropriate collaborative institutional mechanism between Centre, States, and Local Bodies for common Rights of Way, standardisation of costs and timelines, and removal of barriers to approvals? Justify your comments with reasoning.

Bharti Airtel's Response:

We also propose that an Optic Fiber Regulatory Authority be formed to achieve faster, transparent, and economic roll-out of fiber and ensure optimum utilization by effective sharing among service providers. Such an Authority shall be responsible for the following:

- To bridge differences between TSPs and State authorities and local bodies for serving the objective of laying of underground cable infrastructure, expediently and efficiently.
- To facilitate permissions to build fiber across jurisdictional domains of roads (state /national highways), railways, cities and towns (municipalities), forest and defence areas, with clearly defined exceptions.
- To coordinate with TSPs and Public/Government building authorities for the deployment of ducts and fiber inside the respective buildings.
- To coordinate with various bodies to use public infrastructure such as electricity poles for the deployment of aerial fiber cables.

- To coordinate with respective bodies for facilitating the use of supporting infrastructure like ducts, space, and power from other infra agencies like water, electricity, roads, buildings, etc.
- To coordinate with the state/local bodies to ensure a mandatory provision for fiber optic utility ducts on both sides of highways/roads for all new construction/reconstruction, including provisions for deployment of aerial fiber wherever the underground fiber laying is unviable, commercially or otherwise.
- To undertake a review of the progress of fiber deployment.
- To make appropriate recommendations for the amendment of local laws such as Municipal Acts and building by-laws, etc., for alignment with National Policy and facilitating the fiber roll-out
- To assess and determine the RoW/restoration charges in each geography and notify the same.
- To establish and maintain a common application portal for all kind of RoW permissions.
- To facilitate the sharing of fiber among service providers, subject to feasibility.
- To enable the formation of a 'TransCo' - for creating a back-bone, interconnect, and last-mile optical fiber network for the use of all mobile, broadband, ISP, and other digital public and private organizations.
- To facilitate the creation of MDCs (Mini Data Centers) / POPs to host the equipment and provide connectivity and access to end-customers.
- To make rules for facilitating the sharing of Utility Ducts to the Telecom service providers at a nominal cost in a non-discriminatory manner.
- To coordinate with State Governments and other authorities to ensure the fiber infrastructure's security from theft and damage.
- To put in place a quality benchmark & drive compliance for both fiber build & operations as the quality and stability of India's deployed optical fiber infrastructure is also a big concern. Some of the KPIs which may be included are:
  - Loss / km
  - Dark Fiber uptime and availability
  - Build quality, particularly the depth of the fiber laid, compliance & audits

Q10. 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.

Bharti Airtel's Response:

The issues related to RoW policy are two-fold – ***One***, the introduction and implementation of the RoW policy by All States and other Government Departments, and ***Second,*** its execution at the ground level. Therefore, a single and uniform RoW policy should be created by all States

and other Ministries. In those places where the RoW policy is already in place, the policy's bottlenecks should be addressed.

While the LSA level coordination-committee may help, but may not ensure significant improvement in results as authority & governance across the state, center, local bodies may remain a challenge. Therefore, **a National level authority must be created with appropriate empowerment to govern & grant RoW at pre-defined rates**, rules, guidelines & timelines, including grievance resolution in a time-bound manner. That Authority may then define & govern LSA level coordination-committees that should be answerable to central fiber authority, and LSA rights should be limited to operational processing facilitation & coordination only, ensuring granting of RoW as per rates & rules defined by authority.

Q11. Is there a need to develop common ducts along the roads and streets for laying OFC? If yes, then justify your comments.

Bharti Airtel's Response:

To fasten the telecom network, a "Dig Only Once" policy should be created to incorporate designing of Utility Duct with implied RoW permission for Telecommunications in all infrastructure projects, buildings, and housing by-laws. Standardized provisions and specifications for installing utility duct/optical should be part of the construction design policies of all Central, State level authorities and agencies in-charge of all infrastructure approvals and projects, whether private or public (e.g. NHAI/Urban Development Ministry/Housing Ministry/Public Works and local development authorities). In fact, for issuance of completion certificate of the building/ infrastructure, this can be a mandatory requirement.

Such a policy will help avoid the restoration charges and quick execution apart from eliminating any RoW requirement. We suggest that the proposed fiber authority define comprehensive guidelines for such ducts, build, operation, and sharing arrangement.

Q12. How the development of common ducts infrastructure by private sector entities for laying OFC can be encouraged? Justify your comments with reasoning.
&
Q13. Is there a need to specify particular model for development of common ducts infrastructure or it should be left to the landowning agencies? Should exclusive rights for the construction of common ducts be considered? Justify your comments with reasoning.
&

Q14. 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.

&

Q15. What could be the cross-sector infrastructure development and sharing possibilities in India? Justify your comments with examples.

Bharti Airtel's Response:

- Building fiber as a national infrastructure with the mandatory laying of ducts across all roads, streets, gas, oil, power, railway line & state highways is a priority for the nation. This can be done either by a neutral government body or contracted to TSPs. **The RoW charges should be waived off or at least restricted to the cost of restoration**.along with time-bound permissions across the country (through a single-window clearance).
- The duct must be made available by respective authority to TSP at nominal operational cost. One duct from the authority can have multiple cables pulled, as and when needed. Instead of repeat digging, all TSPs will be required to lay fiber in these ducts only – this will ensure no repeat damage to public infrastructure. Further, we suggest that only TSP should be allowed to pull the cable to ensure high-quality infrastructure.
- For the fiber that's laid, TSPs must share spare fiber on a non-exclusive basis and a standard cost-based model (pre-fixed tariff pan India). This will ensure the most efficient and cost-effective way of expanding reach, without duplicating investments.

  Example: The authority provides duct. Fiber is laid by a principal Telecom operator. Other telecom operators, government authorities/ users can lease fiber from the principal TSP. Both duct and fiber lease costs can be standardized across India. Thus, cost and fiber can be shared across multiple users and be monetized effectively. Illustration:

	Cables	Details	Total Fiber/ cable	Govt Authority	First TSP	TSP / USER 2	TSP / USER 3	TSP / USER 4	TSP / USER 5
Authority Duct	Cable 1	Fibers	144	4	72	24	24	12	8
		% of pairs		3%	50%	17%	17%	8%	6%
		Tariff (% of cost+)		FOC	Own	30%	30%	15%	15%
	Cable 2		similar arrangement as cable 1						
	Cable 3		similar arrangement as cable 1 & 2						

- As a PPP model, TSPs can allocate/ provide fiber connectivity to all government & private buildings, public infrastructure for Government usage at district / state / central level. These fiber pairs can be used to build a broadband network for smart cities, security agencies & e-governance projects.
- Existing fiber resources must also be opened up for usage on a similar Cost-plus model. Benchmark costs and consequent tariffs for sharing may be defined through a

consultation paper and inputs from industry stakeholders. Cost & sharing tariffs may be defined by Circle, Zone, or Districts basis to take care of larger RoW variations. There is sizable spare fiber capacity that lies unutilized today across multiple TSPs, PSUs & utility organizations, many of which cannot maintain the quality of this national resource. Mandatory sharing of existing fiber shall drive new investment in uncovered areas.

- To ensure strong governance and transparency for sharing infrastructure, a National inventory of the fiber should be formulated.
- Lastly, fiber has to be treated as a national asset, and only nominal charges should be levied for RoW. State Governments should ensure that strict action is taken to ensure equipment safety, such as towers & fiber.

Q16. 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.

Bharti Airtel's Response:

We believe that the joint trenching model indirectly is already in place through IP1 and IRU arrangements. Therefore, we suggest the coordinated trenching will be a better approach in the form of a common duct policy.

Q17. 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?

Bharti Airtel's Response:

The co-deployment of new infrastructure is considered as one of the most effective ways of optimizing infrastructure development costs along with appropriate policy framework for sharing of existing infrastructure. Therefore, a "Dig Only Once" policy should be created to incorporate the designing of Utility Duct with implied RoW permission for Telecommunications in all infrastructure projects, buildings, and housing by-laws.

Q18. What kind of policy or regulatory support is required to facilitate cross-sector infrastructure sharing? If yes, kindly provide the necessary details.

Bharti Airtel's Response:

We firmly believe that it should be made mandatory to share already built pathways, ducts, fiber infrastructure. Today, many key entities, including state telcos, Railways, Oil & Gas,

Powerlines & state electricity boards, and even state-driven fiber infrastructure SPVs are reluctant to provide dark fiber to end-users. Many have explicit rules not to share dark fiber, and some others maintain a complete lack of transparency to discourage the same. A significant part of this is underutilized without any active larger participation to full fill the needs of Digital India. A framework may be defined by the proposed Fiber Authority to make a balanced environment making the underutilized resource available in the open market while safeguarding interests and investments of the concerned entity also.

When the same agency permits different agencies, it does not define the exact routes, leading to fiber breaks due to misinformation. Clear digital map based permission should be given so that the old user's resources underground are not impacted.

Q19. In what other ways the existing assets of the broadcasting and power sector could be leveraged to improve connectivity, affordability, and sustainability.

Bharti Airtel's Response:

As suggested above, the broadcasting and power sector's existing assets should be made available for sharing at affordable rates. This will ensure faster telecom connectivity and efficient utilization of existing national resources. Therefore, national fiber authority should be created.

Q20. For efficient market operations, is there a need of emarketplace supported by GIS platform for sharing, leasing, and trading of Duct space, Dark Fibre, 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.

Bharti Airtel's Response:

While it is important to have open market developed, the basic enabler is transparency, pre-published rate cards, and mandate for sharing underutilized pathways, ducts & fiber infrastructure. National fiber exchange may be created & governed by the proposed authority to trade on available & utilized capacities. Besides trading, it is much more important for the authority to see which pathways and resources are underutilized, overly expensive, and restricted, making available for larger usage. While doing so, it should be ensured that the investments are protected.

Q21. 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.

Bharti Airtel's Response:

There are multiple factors for adoption of technology / service across the population of a country. Just to take an example from other amenities/ infrastructure,

- Only 5% of households in India have private vehicle
- Only 21% of households have scooter, motor cycle or moped
- Only 45% have bicycles
- Only 47% households have television

(As per 2011 census, https://censusindia.gov.in/2011-Common/NSDI/Houses_Household.pdf)

On similar lines, 60% of mobile subscribers having broadband connections is relatively high compared to the above asset ownership. Penetration of mobile broadband is not only factor of affordability of mobile broadband services and smartphones but is also governed by other factors like:

- Education factor of the customer including digital literacy.
- Availability of content and application in different vernacular languages
- Shared broadband connection (Fixed line or mobile broadband) among different family members
- Need for mobile broadband specially for age group <10years (25% of population)
- People below poverty line (22% of population)

We believe that with affordable handsets, greater digital literacy and enhanced availability of vernacular content the percentage of mobile customers not subscribing to broadband will decrease further in the near future.

Q22. Even though fixed broadband services are more reliable and capable of delivering higher speeds, why its subscription rate is so poor in India?

Bharti Airtel's Response:

The subscription rate of fixed broadband services is largely poor on account of the following factors:

- **Issues related to Right of Way (RoW):**
  Lack of single window clearance and the complicated and time-consuming process for obtaining RoW permissions varies from state to state and is detrimental in nature for achieving faster fiber roll-outs. This, coupled with exorbitant RoW fees (up to 10,000 per

meter), results in unviable commercial fiber deployments by the stakeholders for roll-out to enhance both fixed-line and mobile broadband networks' capacity.

- **Reduced financial viability**
  Another hindrance to creating a viable fixed-line network is the cost TSPs incur in installing and maintaining the infrastructure of a fixed network. Also, the additional burden of license fees of 8% on AGR further reduces the commercial viability of such networks. With approximately 3% of the broadband subscribers belonging to wired subscribers, there is a real need to promote wired broadband services within the country and implement favorable policies that can stimulate the faster network roll-outs. The policies should aim to promote deployment of high capacity bandwidth networks that require deep fiberization as near the customer premises.

- **Maintenance of existing fiber Infrastructure & Promotion of Dig once policy.**
  Several projects which involve the activities related to road widening, laying of electrical cables, maintenance of water and sewer pipelines results in damage to the laid fiber by both the government and private entities. There is also a lack of proper intimation given to the telecom operators before undertaking such project/ maintenance work by the respective authorities. The cable cuts that occur due to such activities also result in service discontinuation and increase fault restoration time by the service providers. This not only causes inconvenience to customers but also results in a significant increase in maintenance costs.

Q23. 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.

Bharti Airtel's Response:

The reasons referred to in response to Q22 are equally applicable and attributable to the slower growth of FTTH subscribers in India.

We believe that there is a requirement of immediate Strategic Policy shift towards urban areas by focusing First on Metros and Top 100 cities to improve availability and affordability of FTTH/ fixed broadband services. The demand for FTTH and fixed broadband is significant in the metros and top 100 cities but is limited by the availability of suitable infrastructure for the provision of FTTH/ fixed broadband services. This requires ease of deployment of infrastructure for faster network penetration, which may be facilitated by:

- Expediting RoW permissions (with the concept of deemed approvals) and Single Window Clearance
- Immediate and uniform implementation of RoW 2016 rules by all the States

- Mandatory provision of ducts and other telecom infrastructure in all new buildings
- Clear Government mandate/ guidelines to the RWAs to stop practices such as charging high charges for access in terms of recurring revenue share or one-time fee.

We believe that a positive start in the said top cities will result in civic bodies in other areas amending their rules in line with the major cities and operators getting incentivized for rolling out FTTH/ fixed broadband services in all other cities/ towns.

Q24. 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.

Bharti Airtel's Response:

Presently, we have witnessed TSPs partnering with the LCOs for the provision of broadband services. However, the following factors inhibit the use of their network for the provision of broadband services:

- **Quality of Infrastructure:** The cable operators provide their services using the HFC network, which has issues of quality and stability due to frequent and numerous fiber cuts and unorganized network design. This limits the use of the existing network for the provision of quality broadband services
- **Response time for consumer complaints:** Customers require reliable Broadband services. However, due to the unorganized network design, frequent fiber cuts, and skilled manpower unavailability, there is no definitive response time for the resolution of customer complaints.
- **New technology upgrades:** Upgrade to fiber network requires Capex and large investments inhibit LCOs from providing broadband services

Therefore, we recommend that the LCOs be encouraged to tie up with the TSPs for building a quality network, which will resolve their issues around quality and response time for complaint resolution.

Q25. 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.

Bharti Airtel's Response:

Unavailability of sufficient licensed spectrum and high cost of end device ecosystem such as outdoor CPEs limit the use of FWA technology for the provision of fixed broadband.

With wireless broadband being the medium largely being used for broadband access, the access spectrum assigned to the operators is used extensively. FWA is largely provisioned on the 2300 MHz/ 2500 MHz band in the case of 4G/ LTE. For FWA provision on this access spectrum, capacity needs to be carved out from the existing wireless network, which is impossible considering the high usage on the wireless network.

In the future, spectrum in the sub-6 GHz band (i.e. 3.5 GHz band) and mm-Wave can also be used with 5G to deploy FWA technology. Such an access will require at least 100MHz in the sub-6 GHz band and 400 MHz or higher in the mm-Wave band. Hence, any use of the access spectrum for FWA requires the allocation of a sufficient licensed spectrum at an affordable price to the operators. The outdoor CPEs deployed for FWA are costlier, which raises the cost of ownership for the customer. We believe that with proliferation, this cost too can come down.

Hence, to facilitate the use of FWA technology for the delivery of fixed broadband services, sufficient access spectrum should be made available at affordable prices to the operators.

Q26. 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.

Bharti Airtel's Response:

Utilization of the core network and the links connecting the core network are being monitored constantly, and due enhancements are made by the operators to ensure that the peak utilization of both the core network and the connecting links is less than 80%. Therefore, core networks are not the bottlenecks for slower fixed broadband speeds, as these are easily scalable.

The challenge of lower fixed broadband speeds in India is due to:

- Quality of fiber from access to core network: India has the highest fiber cuts compared to other countries, especially in developed economies, which leads to lower quality of fiber with time, due to multiple splicing and patches on the fiber network
- Limitation of fiber pairs in the network from the access network to the core network
- Insufficient bandwidth provisioned by content providers from the core network to their content platforms.
- Inefficient routing and placement of content in the network within the country
- The absence of content serves for some application providers within-country leading to higher latency, jitter, and lower throughput.
- Higher loading on content servers leading to lower throughput to end customers

Q27. Is there a need of any policy or regulatory intervention by way of mandating certain checks relating to contention ratio, latency, and bandwidth utilisation 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.

Bharti Airtel's Response:

As stated in response to Q26, lower throughput for the end customer is not a factor of the core network's performance but other variables outside the core network's control, as mentioned above. Hence, any checks relating to the core network performance is unwarranted.

Besides, the Indian market is the most competitive globally, with the choice of many service providers available to the end customers. If the user is not satisfied with the performance, one can choose to change the operator without breaching any commitments.

Therefore, we do not recommend any policy or regulatory intervention by way of mandating certain checks in the core network.

Q28. Should it be mandated for TSPs and ISPs to declare, actual contention ratio, latency, and bandwidth utilisation achieved in their core networks during the previous month to their customers while communicating with them or offering tariff plans? If no, state the reasons.

Bharti Airtel's Response:

As stated in response to Q27 & Q28, the core network is not the limiting factor and hence there should be no mandate for TSP's and ISPs to declare, actual contention ratio, latency, and bandwidth utilization achieved in their core networks during the previous month to their customers while communicating with them or offering tariff plans

Q29. 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.

Bharti Airtel's Response:

India has one of the highest data consumption worldwide (next to China) in terms of total mobile broadband payload and payload consumed per subscriber, coupled with the lowest

data tariffs among any other country in the world. Mobile broadband networks are most innovatively designed and configured for parameters such as spectral efficiency and users' concurrency. The key bottlenecks for lower throughput per subscriber in India are:

- Lower spectrum availability in the market. India has only 165MHz of the spectrum (FDD equivalent) for four operators compared to 300MHz - 400MHz of spectrum in other countries.
- Lower fiber infrastructure: Less than 25% of mobile towers are fiberized in India as compared to more than 70% of fiberized towers in other countries
- Lower microwave spectrum availability for backhaul which becomes more critical, especially in the absence of fiber assets
- Lower quality of infra availability in terms of reliable grid power leads to outages even with backup power due to towers in far-flung rural areas. (grid power is mostly unreliable in these far rural areas)
- A higher amount of fiber cuts than any other markets, thereby leading to degradation in service availability and quality of fiber over its lifecycle.

Considering the above, the telecom network's assets and infrastructure are responsible for lower throughput in mobile broadband services compared to other countries using similar technology. The infrastructure issues need to be handled on an urgent basis rather than the radio network's design, which would only work once infrastructure issues are taken care of.

Q30. 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.

Bharti Airtel's Response:

As stated in response to Q29, the infrastructure issues need to be handled on an urgent basis rather than the radio network's design, which would only work once infrastructure issues are taken care of.

Therefore, we do not recommend the need for any policy or regulatory intervention by way of mandating certain checks relating to RAN user plane congestion.

Q31. 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.

Bharti Airtel's Response:

As mentioned in the above responses, congestion over air interface or backhaul is beyond network design. This is due to a shortage of assets such as spectrum in the access and backhaul network, fiber reach, quality of fiber, etc., which need to be taken care of to improve the user experience in the mobile broadband network.

Customers are looking for an end-to-end experience that is not only influenced by radio network but also governed by the quality of their device, their content and application providers' infrastructure and its connectivity to the telecom network, and other infrastructure aspects mentioned in the above responses. Communicating congestion parameters of radio networks to customers would be very narrow and misleading information to the customers. Even if the radio network congestion is low, users will not get good experience if all other parameters are not as per their service requirements.

Finally, users choose the operator in the world's most competitive market. If they are not happy with their service provider, they have the choice to change their service provider without having any long-term commitments.

Hence, we do not foresee any need for mandating the TSPs to declare actual congestion, the average across the LSA, recorded during the previous month over the air interface, in the radio nodes, and/or over the backhaul interfaces between RAN and CN, while reaching out to or enrolling a new customer.

Q32. 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.

Bharti Airtel's Response:

Yes, there is a definite need for regulatory intervention by way of mandating due checks relating to consumer devices.

Devices play a significant role in defining user experience. Key examples that have been established in the past and brought to notice of DOT / TRAI are:

- Dual-SIM handsets have degraded performance when 4G only SIM is placed in 3G/2G only SIM slot of these smartphones.
- Location-based information is not available in more than 75% of smartphones.
- Smartphones do not support all frequency bands, especially lower bands, which deprives users to have good in-building coverage

- VoLTE & VoWiFi launched by network operators are not supported by all smartphones, limiting the use of these technologies' benefits.
- Enhanced codecs such as EVS or other efficient codes are not supported by the smartphones, thereby limiting voice quality for the users even while the network supports these
- Even high-end smartphones have been identified with issues such as higher mutes, no audio due to issues in the telephony layer of the handsets, getting stuck in "limited capability mode", not able to register on VoLTE / VoWiFi, frequent handover between technologies such as VoWiFi to VoLTE etc.

Smartphones being launched in India are not mandated to be certified by agencies like GCF, which has been the standard practice followed by global markets. Given these gaps, minimum set of mandatory certification needs to be achieved by any device before being launched in India. These mandatory certifications should be

- GCF certification
- Minimum certification as defined for Indian network scenario and services

Therefore, we recommend that **there is an urgent requirement to mandate certification of smartphones** as they play a significant role in defining user experience.

Q33. 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.

Bharti Airtel's Response:

Yes, as mentioned above, there should be a minimum set of standards that should be defined for any open market smartphone / device to be launched in India. These shall be related to mandatory regulatory compliances, radio performance, spectrum band compatibility as per Indian spectrum allocations, key features that impact customer experience for voice, video, and data services.

This should not impact the affordability or accessibility of the smartphones / devices in the market, as most of these are software-based capabilities. To ensure timely completion of the certification process, lab infrastructure for validation and certification should be established such that the system is able to handle the load within defined TAT (turnaround time). Certification should not be limited to single agency which would certainly impact both quality of testing and turnaround time for certification, thereby causing potential accessibility and affordability challenges.