Bharti Airtel's proposed position to TRAI's Consultation paper on "Delivering Broadband Quickly: What do we need to do?"

Preamble:

The role of affordable broadband in the development of modern economies is well established. A report by ICRIER in 2012 reveals that Indian States can grow their GDP 1.08 % points higher for every 10% increase in internet subscribers[1].

The Government has set bold policy objectives of building 'Broadband Highways' and a 'Digital India' through affordable and reliable broadband-on-demand by the year 2015. It also envisages 175 million connections by 2017 and 600 million by 2020 at minimum 2 Mbps download speed, with higher speeds of at least 100 Mbps available on demand[2].

However, despite being the 10th largest[3] economy of the world in terms of GDP, India ranks 122 in fixed broadband penetration and 108 in mobile broadband penetration. It is clear that efforts need to be directed towards addressing critical issues that have prevented the proliferation of broadband in the country.

With over 918 million wireless subscribers as opposed to a mere 28 million wireline subscribers, it is clear that wireless emerges as the stronger contender to realize national broadband goals. Due to its faster time to deployment, and an already large subscriber base, we believe wireless to be the single largest contributor to the realization of these goals.

We believe that there must be a clear set of four guiding principles that should be considered while framing the national broadband policy. These principles would enable a win-win for all stakeholders - consumers, government and industry.

These principles are:

1. Ensuring adequate spectrum, so as to provide quality broadband services:

Increased consumption of data services throughout the world has established that data growth is exponential, requires large availability of spectrum and is decoupled from revenue growth. In fact, today, even in India, data volume with a consumer penetration of approx. 20% is almost equal to voice volume (in MBs) despite contributing only 10-12% of wireless revenues. As per our estimates, the additional spectrum required to meet national broadband targets could be as high as 1120 MHz (per service area) by 2020.

Against this backdrop, we believe there are three critical enablers to meet this demand in the future:

[1] http://www.icrier.org/pdf/Internet_Release_20jan12.pdf
[2] http://www.dot.gov.in/sites/default/files/NTP-06.06.2012-final.pdf
[3] http://www.thehindubusinessline.com/news/in-terms-of-gdp-indias-economy-is-10th-biggest-world-bank/article6196736.ece

- First, there should be a sound policy for incentivizing government users to vacate their spectrum for broadband services.
- Second, adequate availability of spectrum must be made available to each TSP so as to avoid needless fragmentation of holdings.
- Third, the efficient utilization of spectrum granted should be ensured through a framework of optimal management of spectrum bands along with a policy to share and trade spectrum.

2. Uniform and simplified rules for the grant of Right of Way permissions:

The deployment of broadband wireless network raises the need for tower sites and backhaul bandwidth. The increased backhaul capacity requirement for broadband wireless technologies necessitates the need for deeper fiber penetration. Further, deployment of small cell technologies, FEMTO, PICO, DAS etc. is also dependent on the fiber backhaul to a great extent

The lack of fiber connectivity is one of the weakest links in the chain and may act as a dampener to achieving the desired objectives. Grant of RoW permission is an impediment to laying ducts and installation of towers, thereby, leading to delay in roll out of network. Moreover, the operators face considerable challenges in obtaining requisite permissions, such as arbitrary and adhoc guidelines /restrictions, difficulties in site acquisition, high incidence of levies and taxes, complicate and time-consuming procedures etc.

To enable faster rollout of services, the Government must consider framing of additional rules under the Indian Telegraph Act that aim to create an enforceable sectoral policy framework for the grant of Right of Way permissions in an efficient and non-discriminatory manner. The policy should ensure continuity, consistency and expansion of services by way of:

- Speedy approvals of Right of Way.
- A uniform tower policy across all states to avoid coverage gaps and inferior quality of service
- Charges for Right of Way should not be more than the cost of repairs.

3. Ensuring sound financial health of the industry to drive investments

To support the broadband revolution, the sector needs enormous investment. ASSOCHAM estimates indicate that Indian TSPs needs to commit cumulative Capex of Rs. 2,50,000 Crs. over the years 2013-20.

Presently, the cumulative debt burden on telecom companies has more than doubled from Rs. 82,726 Crs. in 2008-09 to Rs.1,85,720 Crs. in 2011-12. The EBITDA margins of telecom companies have fallen from 33.8% in 2008 to 28.9% in 2012. The PAT of the TSPs which was in the range of 35% to (-)53% in 2006-07 has declined in the range of 14% to (-)101% in 2011-

12. This has led to TSPs exiting the sector, scaling down their operations and reducing future investments.

To ensure sound financial health of the industry, the following needs to be ensured:

- First, overall taxes/levies on telecom sector including license fee, USO and spectrum usage charge should be lowered.
- Second, adequate spectrum with a reasonable reserve price should be made available in any auction
- Third, the price of spectrum (upfront and recurring) needs to be set at an optimal level. Failure to do so will result in an increase in tariffs thereby impacting affordability. In addition, it will inhibit the required investment in infrastructure and technology.
- Fourth, spectrum sharing, spectrum trading and a sound merger and acquisition policy must be put in place to complement the above.

4. Ensuring progressive and stable regulatory policies

A stable and predictable regulatory regime is essential for attracting enormous investments. We believe that there are two key enablers to ensuring an enduring and non-discriminatory policy framework:

- First, the intent of the policy under which a license is granted should not be overturned as seen in denial of extension of mobile licenses.
- Second, frequent changes in the licensing regime should be avoided as witnessed by the government's attempt to bring Virtual Operators when the Unified licensing regime is yet to be implemented fully.

In summary, by making adequate spectrum available at affordable prices, ensuring a stable regulatory regime and rationalizing current tax & RoW policies, broadband in India can be accelerated to achieve the ambitious goals of the government's 'Digital India' initiative. In this context, we respectfully submit our response to the specific questions raised by the Authority below:

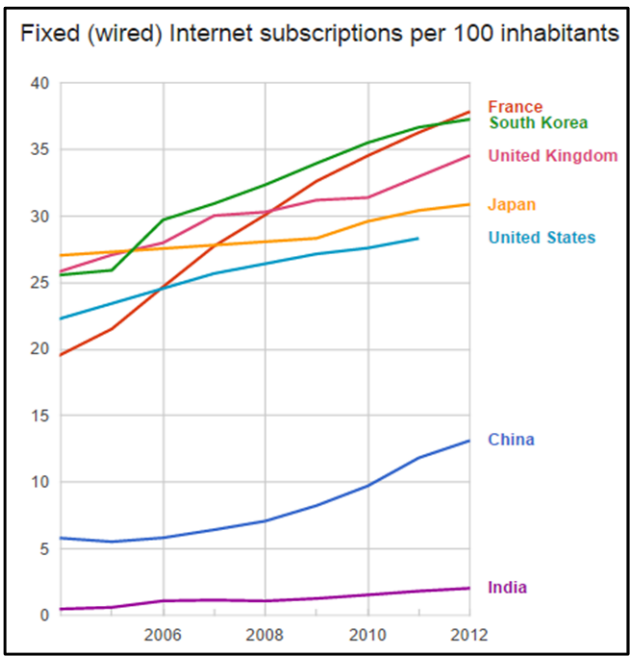
Q1. What immediate measures are required to promote wireline technologies in access networks? What is the cost per line for various wireline technologies and how can this cost be minimized? Please reply separately for each technology.

Bharti Airtel's Response:

The penetration of Wireline internet and broadband in India is abysmally low as compared to the other countries. The graph[4] depicts the status of Fixed Internet connections per 100 inhabitants compared to countries like China, UK, USA, Japan, South Korea & France.

[4] ITU portal for key ICT data and statistics - http://www.itu.int/net4/itu-d/icteye/

Moreover, as indicated in table 2.2 of the consultation paper, growth of fixed line subscribers shows a negative (declining) trend. In contrast, wireless subscriptions have shown tremendous growth. Considering these facts, it is evident that wireless will play a key role in achieving the nations' broadband targets.



However, this does not undermine the potential of wireline. A good wireline network will complement the wireless network as it can ease shortage of spectrum and reduce the load on critical resources. Wireline infrastructure is also required as a backhaul for facilitating Wi-Fi access.

We believe that India needs at least 75 million wireline customers. However, the impediments to the growth of wireline networks are the high cost of access network, difficulty in getting RoW permissions and high maintenance costs. In order to enhance/ promote wireline connectivity these issues will have to be addressed. Some of the measures to promote wireline technology include:

- **Right of Way (RoW) for laying OFC Fiber and Cables:**
  Wireline networks require laying of Fiber/ cable from the exchange premises right up to the customers' premise. Thus, RoW permission and its associated cost is a major impediment. To promote wireline broadband penetration, the government should mandate the following:
  - Laying of ducts across all highways, crossings and bridges.
  - All buildings/tower should be provisioned with vertical conduits for carrying out last mile building wiring for wireline and FTTH services.
  - RoW cost be rationalized and shall be charged to recover the cost of repair.

  The measures are further detailed in our response to Q12.

- **Sharing of FTTH infrastructure:**
  Deployment of FTTH infrastructure is highly capital intensive. Moreover, considering the building plans and feasibility, it is not always possible to terminate more than one fiber in a home premise. While the same access network i.e. FTTH is capable of being shared by many access and internet service providers, the present licensing conditions do not

facilitate sharing of such infrastructure among access/ internet licensees. We recommend that the license conditions of the access and internet licensees should be suitably amended to allow active Infrastructure sharing. This will enable sharing of FTTH, deployed by a service provider, among several access and internet service providers. This will also help in reducing costs, increasing viability and affordability of services.

- **Copper local loop unbundling:**
  Laying of copper cable requires huge investment and is a sunk cost when the customer churns out. It is, therefore, unlikely that private operators will invest into laying copper cables. On the other hand, the PSU operators have an extensive copper network that is largely under-utilized. We recommend that the same should be treated as a National resource and may be unbundled/ shared with private operators in rural and city areas for commercial considerations.

- **Zero Licence Fee:**
  The Government should consider zero license fee and USO levy on the revenue from wireline access. While the major beneficiaries of this policy would be the PSUs, which control 76% fixed line market share; however, these incentives will encourage more private operators to enter into this business.

- **Reduction of taxes/ duties:**
  Since, the cost of providing wired broadband is already high, reduction in following duties and taxes will help in incentivizing the investments:
  - Zero duty on Broadband equipment including Optical Transport Network.
  - Zero Import duty on Customer Premises Equipment (CPEs).
  - Zero Import duty on Optical Network Terminals (ONTs).
  - The recently introduced imposition of 10% additional duties on all equipment with optical interfaces should be withdrawn.

The cost modelling of Wireline Technologies is annexed at Annexure – I.

Q2. What are the impediments to the deployment of wireless technologies in the access network? How can these deployments be made faster? Please reply separately for each technology.

Bharti Airtel's Response:

Following are the major impediments in the deployment of wireless technologies in the access network:

- **Availability of adequate spectrum:**
  Availability of adequate spectrum is critical for the deployment of wireless broadband. However, Indian TSPs have much less spectrum compared to their counterparts in Asia & the rest of the world. The unavailability of adequate spectrum is the biggest impediment to optimal broadband penetration and requires urgent attention of policy makers. Details of the same have been shared in response to Q17.

- **Lack of a predictable short and long term spectrum road map:**
  With over 918 million wireless consumers and a mere 28 million wireline consumers, it is certain that wireless is going to be key driver of broadband growth. Demand for spectrum will rise manifold and operators will have to plan their network keeping in view the future demand for services.

  Unavailability of a spectrum road map leaves operators with no visibility over the future availability of the basic raw material for wireless broadband services and forces them to buy spectrum before they actually need it. In a likely scenario, an operator would have bought spectrum quite early than its requirement, leading to its under-utilization and an operator requiring spectrum, but unable to buy, to continue servicing their customers with less spectrum and inferior quality of service.

  In addition, any spectrum should be actioned taking into account the local ecosystem for equipment and devices at that point in time. Lack of a mature ecosystem can lead to under-utilization of the spectrum and limit the flow of funds into network deployment. The 2100 MHz band, the 1800 MHz band and the 900 MHz band are most developed across a range of 3G, 4G and 2G technologies. In addition the 800 MHz band offers the possibility of being used for CDMA as well as LTE/3G in an agnostic manner. On the other hand, bands such as 700 MHz and 2300 MHz have limited ecosystem. Following this principle will ensure precious capital is not blocked and is utilized for expanding broadband in the country

- **Fragmented spectrum holdings due to large number of TSPs:**
  Operators currently have fragmented spectrum holdings and spectrum being auctioned is also largely fragmented. Such spectrum does not support broadband wireless technologies and also acts as a barrier for its refarmed use for broadband technologies.

- **High cost of spectrum both upfront and recurring:**
  Indian operators have abysmally low spectrum holdings compared to their counterparts around the world. With an auction of minimal spectrum in a market of 7-12 operators, the auction determined price will always be too high. Further, recurring spectrum usage charges in India are also very high compared to other countries, wherein it is not more

than 0.5-1%. The high cost for spectrum, both upfront and recurring, leave operators with lesser funds to re-invest in the deployment of networks.

- **Right of Way for laying OFC Fiber and installing towers:**
  Operators face considerable challenges in obtaining the requisite RoW permission due to arbitrary and ad-hoc guidelines/restrictions, difficulties in site acquisition, high incidence of levies and taxes, complicated and time consuming procedures, etc**.** This increases the cost of deploying network sometimes to the extent of rendering the entire initiative unviable. Detailed responses have been submitted in our response to Q. No. 11.

We believe that the following suggestions, if implemented, can help in timely and faster deployments of wireless networks:

- **To make available adequate spectrum in various bands:**
  The following initiatives will help in getting additional spectrum to TSPs for effective rollout of broadband services:
  - Swapping of spectrum with Defence
  - Realigning spectrum allocated to the Government/PSUs
  - Timely allocation of available spectrum
  - Licensed Shared Access (LSA) based access
  - Identification of new spectrum bands

  Details of the above initiatives have been shared in our response to Q17.

- **Incentivize the government/ PSU spectrum holders to vacate spectrum:**
  'Clearing the spectrum' is one straightforward way to free up more exclusive spectrum for mobile broadband use. This has been practiced over the years, and will continue to be one of the preferred options. In most cases, however, clearing spectrum requires significant investment and/or lengthy development time. Cost of such re-deployments can be subsidized by using portion of proceeds from spectrum auction of "freed up" spectrum. However, such benefit should come with a condition of vacating spectrum in a time bound manner, failing which a spectrum holder may be held accountable for the fair value of spectrum in its budgetary allocations.

- **To formulate a spectrum road map:**
  It is critical to put in place a fair, predictable and transparent spectrum roadmap so that operators are aware of the future availability of spectrum in short and long term (band and year wise). This will help operators in better planning and execution.

- **Harmonization of spectrum in 800 MHz, 900 MHz, & 1800MHz & 2300 MHz band:**
  Harmonization of existing spectrum holdings in the 800 MHz, 900 MHz, 1800 MHz & 2300 MHz band will enable availability of contiguous spectrum for auctions. It will also free up the white spaces/ guard bands presently in between.

- **Rationalize the cost of spectrum - upfront and recurring:**
  Sufficient quantum of spectrum should be made available at reasonable price to enable operators to invest in deploying their networks and providing affordable services. Further, spectrum usage charges should be kept at a nominal/minimal level so as to recover the cost of spectrum management and administration.

- **Sharing of active infrastructure:**
  The government should allow sharing of active infrastructure to ensure optimization of costs and proliferation of affordable services.

- **Promote the consolidation by way of liberalized policy on spectrum sharing, spectrum trading, M&A guidelines and spectrum caps:**
  Presently, there are 7-12 operators in each service area. The presence of high number of TSPs has led to excessive fragmentation of spectrum and the Indian TSPs are holding abysmally low quantum of spectrum, approx. 13MHz on average, as compared to its international counterparts e.g. {(EU allocation (92.6MHz), UK (82.2MHz), France (138.5MHz), Spain (100.6MHz) and US (96MHz)}.

  In view of the aforesaid, the Industry is in dire need of consolidation. Recognizing this, TRAI has not only acknowledged the need for lesser TSPs in India, but also the need for promoting consolidation. In this context, TRAI has already recommended that the government allow spectrum trading and sharing. Further, there is a need for liberal M&A policy to facilitate consolidation.

  Such consolidation would be viable only if the present spectrum caps are relaxed without adversely affecting competition and minimum number of operators. The current spectrum cap is based on the notion that one operator should not hold beyond 25% of overall spectrum holdings irrespective of its revenue and subscriber market share. In contrast, spectrum holdings in India are quite skewed. For instance, top three TSPs holds 33.8% of the overall spectrum holdings with 70% combined revenue market share compared to 30.7% spectrum holdings held by nine TSPs together and combined 9.4% revenue market shared.

  Therefore, large and serious operators need an access to more spectrum to serve their large customer base and the TRAI should at least consider increasing the cap for spectrum holdings from 50% to 60% for a particular spectrum band and from 25% to 35-40% of the total holdings in all bands together. To ensure effective competition, the government may ensure that at any given point in time, at least four operators including one PSU operate in the market.

The above is also critical as providing a superior broadband experience over wireless depends on the availability of large amounts of spectrum. The current spectrum caps fail to take into account the amount of spectrum that would be required to provision a high quality broadband experience over wireless. Failure to increase, if not eliminate the current caps, would force TSPs who are currently considering network expansion, to abandon its plans to offer broadband services, primarily on account of not being able to hold enough spectrum to ensure QoS, and eliminate the prospects of associated investments.

- **Right of Way for laying OFC Fiber and installing towers:**
  There is an urgent need for framing of Rules under the Indian Telegraph Act to create an enforceable framework for a sectoral policy for Right of Way and a smooth coordination between service providers and State Governments/ local bodies.

  Under such framework, RoW permissions may be facilitated via online single window clearance with a defined turnaround time for all RoW agencies, standardization of ROW rates and issuance procedures for all State/Local govt. bodies. Further details over this issue have been shared in our response to Q11.

- **Review the requirement of Wireless Operating License (WOL), Import License & SACFA:**
  While the industry needs to gear up for broadband revolution, which requires faster network rollouts across the nation, the associated processes of obtaining 'wireless operating licence' and 'import licence' before rolling out the sites and network, raises administrative challenges and leads to delay in getting the approvals. This has a significant negative impact on network planning and rollout of network. Therefore, it is essential that the administrative bottlenecks and outdated processes such as 'import licence' and 'wireless operating licence' be reviewed and abolished.

  While the process of SACFA approval has been simplified by the Government, however certain bottlenecks still exist. The time taken for obtaining SACFA approvals is still an unresolved issue. There is, therefore, a need for further simplification of the process to have a single window clearance and timely approvals by SACFA.

Q3. The recommendations of the Authority on Microwave backhaul have been recently released. Are there any other issues which need to be addressed to ensure availability of sufficient Microwave backhaul capacity for the growth of broadband in the country?

Bharti Airtel's Response:

We appreciate the efforts of the Authority for coming up with comprehensive and detailed recommendations on Microwave Access and Microwave Backbone.

However, we believe that rates for MWB at INR. 13,900 per Km per annum recommended by the Authority are on the higher side and may need to be re-evaluated. It is expected that the Government would consider these recommendations shortly and come up with a detailed policy. Therefore, the following support/ enablement is required at the earliest:

- E band and V band both are capable of supporting high bandwidth in a very short haul scenario and can effectively meet the needs of last mile connectivity in dense areas. It is recommended that both bands should be opened up for allocation at the earliest.
- For large scale deployment, expedited and error-free allocation will be a key criteria for the success and spread of E band/ V band. There should be faster allocation (within a day) and strict SLAs on the entity deputed for such allocation.
- Besides the already allocated MWA (Microwave Access) bands of 13, 15, 18 & 21 GHz, it is strongly recommended that additional bands in 26, 28, 38 & 42 MHz should also be opened with a wider carrier bandwidth of 56 MHz.
- MWB (microwave backbone) plays critical role in backhauling far flung, distant & rural areas. MW backbone had contributed enormously to enable 2G to rural India. It can also be a key enabler in taking broadband to rural India, if more spectrum is allocated for this purpose. The bands of 6 GHz, 8GHz & 11 GHz should also be opened for MWB.

Q4. The pricing of Domestic Leased Circuits (DLC) have been reviewed in July 2014. Apart from pricing, are there any other issues which can improve availability of DLC?

Bharti Airtel's Response:

As a policy, we recommend a tariff forbearance regime for telecom sector that allows operators the flexibility to price services, with due considerations to their existing investments and the varying demand and supply constraints across the nation. Building telecom infrastructure is a large-investment and long-gestation business and mandating access to telecom networks at regulated prices would create uncertainty over eventual returns and the business plans of operators. Therefore, the regulator, as a general policy, should continue with forbearance regime for telecom market unless it demonstrates any signs of market failure or anti-competitive behavior.

Specific to DLC market, competition has consistently driven down prices, with a total of 34 NLDOs, and 7-12 access service providers in each service area. Some locations/ routes are also characterized by large discounts over the TRAI ceiling rates. Therefore, we request the Authority to review its current DLC regulation and place the tariff of DLC under forbearance to promote more investments.

Apart from the pricing of services, certain costs, such as exorbitant and arbitrary RoW charges merit the consideration of the Authority. The exponential increase of RoW charges over only

the last two years is an indication of the arbitrary, unscientific and uneconomical levy of these charges. Detailed submission on the issue of RoW has been included in our response to Q11.

Q5. What are the specific reasons that ISPs are proactively not connecting with NIXI? What measures are required so that all ISPs are connected to the NIXI?

Bharti Airtel's Response:

NIXI is a neutral Internet exchange for peering of ISPs among themselves, so that domestic traffic is routed within the country leading to better quality of services, reduced latency and reduced bandwidth costs. Its purpose is to supplement the connectivity of the ISPs who do not have direct connectivity and not to undermine the importance of direct peering. Connectivity via the Internet exchange also involves additional transit point thereby increasing the latency and quality of service.

Moreover, interconnect of all the ISPs at NIXI will not serve any purpose as even today most small ISPs are connected to one or more Class 'A' ISPs, who in turn connect to each other via peering arrangements. As per the estimate, a very miniscule (<1%) portion of domestic traffic is routed from outside the country thereby implying that the present arrangement is working well.

Reference is also drawn to the Hon'ble TDSAT judgment dated 3rd May, 2005 in Appeal No. 31, in respect of direct connectivity viz-a-viz via a Gateway, wherein it has been observed that the connectivity via the gateway would become a bottleneck and failure of this Gateway would lead to failure of entire network.

Besides the above, in order to interconnect with NIXI, regional ISPs need to buy long distance lease lines and have to pay NIXI in 'X-Y' model which increases cost for regional ISPs. Hence, they prefer to interconnect with an upstream provider at a local location as Internet Transit costs are already very low in India and they get access to NIXI routes from the upstream provider.

Further, the domestic exchange of internet traffic is quite low when compared to international bandwidth usage as a majority of the content is hosted outside India. Therefore, measures should be taken to host more content to India, which will increase domestic traffic and improve domestic bandwidth utilization.

Q6. Would the hosting of content within the country help in reduction of the cost of broadband to a subscriber? If yes, what measures are required to encourage content service providers to host content in the data center situated within India?

Bharti Airtel's Response:

The hosting of content within India, for local and foreign content, should be encouraged to accelerate the speed, delivery and growth of internet and broadband services. The hosting of content within the country enables better quality of services due to reduction in latency.

Such hosting will create thousands of jobs and local contents, as well as help secure the country's internet traffic from unauthorized monitoring and screening. Therefore, developing India as a content and transit hub would help it secure a competitive advantage for the foreseeable future.

Therefore, the government needs to encourage local and foreign companies to build 'Data Center Parks' on the lines of Industrial parks, SEZs, etc by providing them land, infrastructure and uninterrupted power supply at affordable rates. To promote Data Centers, the government also needs to address a significant policy anomaly wherein telecom companies are subject to licence fee on Data Center revenue but non-telecom companies are not.

Besides, the government also needs to allow foreign companies (those who do not want to set up companies in India) to buy services like colocation/power and IP/peering services directly as well as for remote access to their equipment.

Q7. Are PSUs ideal choices for implementing the National Optical Fiber Network (NOFN) project?
&
Q8. Should awarding of EPC turnkey contracts to private sector parties through International Competitive Bidding (ICB) be considered for the NOFN project?
&
Q9. Are there any ways in which infrastructure development costs can be reduced? Is it possible to piggyback on the existing private sector access networks so as to minimize costs in reaching remote rural locations?
&
Q10. What can the private sector do to reduce delivery costs? Please provide specific examples.

Bharti Airtel's Response:

The government's initiative to commission a National Optical Fibre Network (NOFN) to connect 2,50,000 Gram Panchayats with a maximum speed of 100 Mbps, though well intentioned, may fail to live up to its true potential. A national network of such proportions could not only potentially extend connectivity to those at the base of the pyramid, but would also generate skills and employment, empower the rural, and stimulate overall economic growth. These objectives can be realized only through a holistic policy that addresses some

of the critical strategic and operational issues as they stand today. These are highlighted below.

- The envisioned National Optical Fibre Network is a middle mile access solution that lacks the provisioning of end-to-end bandwidth and/or last mile access, critical for realizing the policy objectives of inclusive and universal access.
- NOFN would only deliver critical services at the Panchayat level through community-based service provisioning. Efficient and viable delivery of community services however, would require extending this connectivity to the last mile, for example to school premises, to village health centers and to individual households to create awareness and to stimulate economic growth.
- To function as a successful wholesale bandwidth provider, the NOFN initiative would require increased coordination between the government and private operators with due consideration to the principle of 'demand and supply'. Fibre should first be deployed in areas/regions characterized by higher demand (currently untapped urban areas), and subsequently extended to other regions. This would afford the initiative, the momentum it needs to roll out a national network progressively and in an optimal manner. Fibre in the wrong place, or in areas with low demand, would be unviable for TSPs to enter, and would constitute a waste of time and national resources.
- Besides deploying a NOFN, it is equally important to develop an institutional framework that would allow the private service providers non-discriminatory access to the network. Physical access to the network should be enabled through a single window mechanism with stipulated time frames that would ensure increased usage from all operators and higher usage of NOFN
- The slow progress of building NOFN as well as alternate network for Defence shows that PSUs lack the adequate skills to execute such projects effectively and in a timely manner. The concept of public private partnership may be introduced. Auctioning the rights to private players to infuse rapid execution of the project may also be explored.
- Infrastructure development costs can be reduced by sharing infrastructure as well as through the imposition of lower taxes and levies. For instance, RoW is a significant cost for telecom infrastructure especially in big cities, which needs to be lowered significantly.

Q11. What are the major issues in obtaining right of way for laying optical fibre? What are the applicable charges/ constraints imposed by various bodies who grant permission of right of way? In your opinion what is the feasible solution?

Bharti Airtel's Response:

The RoW permission is required for laying optical fiber and constructing telecommunication towers. Telecom operators are guaranteed RoW under Section 10 of the Indian Telegraph Act, 1885. In fact, the Government had also issued a notification on 24th May, 1999, permitting

the licensees under Section 4 of the Act to seek way-leave from any person including public authority, public corporation, autonomous body, State Government or Central Government in the respective licenced service areas for the purpose listed therein.

However, operators face considerable challenges in obtaining requisite permissions, (failing additional guidelines/rules by way of Gazette Notification), some of which are enlisted below:

- **Arbitrary and ad hoc guidelines /restrictions:**
  The policies for setting up the cellular towers are ad-hoc and arbitrary across States. There is no consistency in the documents requested by local bodies to grant clearances and these vary from Sanctioned Building Plan, Occupancy Certificate, Registered Lease Deed, etc. Some documents are either unavailable due to practical problems pertaining to compliance of local building laws or the additional expense they represent for landlords to acquire. There are local laws that restrict the duration of tenancies e.g. Tribal Areas where tenancy of over 5 years is not permitted.

- **Difficulties in Site acquisition:**
  There are associated difficulties in land/ site acquisition. These include restriction of location of towers, misplaced concerns regarding structural safety and integrity etc.

- **High Incidence of levies and taxes:**
  Various municipalities and State agencies across the nation stipulate proprietary norms for granting permission/ access and levy exorbitant charges. There is high incidence of taxes and levies on cellular towers. Various State Governments charge a land conversion tax (from agriculture to commercial land) for installing mobile towers whereas power line towers, under the same infrastructure classification, are exempted from such taxes.

  As per the Act, the charges that can be levied for granting RoW shall be limited to restoration or other charges connected with or related to the work undertaken for laying of cables. However, the same is rarely the case and hefty charges are levied in lieu of granting RoW permissions. A lack of uniformity in RoW policy as well as the absence of any socio-economic merit for differential charging by various states/ municipalities, sometimes within a single state, has a significant negative impact on the business plans of the telecommunication/ infrastructure service providers. This creates an additional burden on telecom service providers and impedes not only the augmentation of capacities in urban locations but also the expansion of rural networks.

- **Complicate and time-consuming procedures:**
  The procedures for obtaining RoW permission are complicated, cumbersome and time consuming. Lack of a single window clearance and clearances from multiple authorities/agencies with no definite time frame for grant of permission leads to

considerable delays in obtaining requisite permissions and delays the rollout of the network.

To overcome the challenges faced, we propose additional Rules under the Indian Telegraph Act that aim to create an enforceable sectoral policy framework for the grant of Right of Way permissions in an efficient and non-discriminatory manner. Such Rules /national RoW policy would address the concerns that have arisen on account of the differences between DoT guidelines and State Governments' demands as these would be binding on all, including the State Governments. They would also have an overriding effect on all Rules / Guidelines / Policy Circulars hitherto issued by State Governments and would also meet the purpose of an amendment to the original Act.

In this regard, we would like to draw your kind attention to Section 7 of the Indian Telegraph Act 1885 which gives the Central Government the power to notify rules for the conduct of telegraphs established, maintained or worked by the Government or by persons licensed under this Act. Section 7(2)(e) empowers the Government to make rules to lay down the conditions and restrictions subject to which any telegraph line, appliance or apparatus for telegraphic communications shall be established, maintained, worked, repaired, transferred, shifted, withdrawn or disconnected.

We submit that the conditions that can be imposed by local authorities for deployment of all kinds of telecom infrastructure elements should be notified as Rules under Section 7(2) (e) the Telegraph Act and the Rules thus framed would be statutory in nature and binding on all including State Governments.

Some immediate actions that can be initiated to ease the process of obtaining RoW are:

- Online Single Window Clearance with a defined turnaround time for all RoW agencies/Authorities at State and Centre levels for application, payments and clearances, monitored and administered by a single dedicated agency at national level.
- Standardization of ROW rates and issuance procedures for all State/Local govt. bodies like PWD, Municipal Corporations, Nagar Palikas, Nagar Nigam, Industrial Development Corporations, SEZs, SH, State Forest, Irrigation dept., Local Development Authorities, Gram Panchayat etc.
- ROW rates and issuance procedures should be standardized and fixed for a period of at least 5 years for all Central agencies like Railway, NHAI, Defense, BRO, Protected/Wild life forest, AAI, PSU-GAIL/SAIL/IOCL/ONGC etc.
- Uniform RoW payment model - one-time nominal payment for administrative expenses for approval clearances and permissions irrespective of authorities. Presently, there are different payments models in existence.
- In some circles, ROW permissions are coupled with a precondition to connect & provide bandwidth with Internet connectivity to Govt. offices like Jharnet, IT Depts., DHQ/BHQ

(District/Block Head Quarters) – we propose a decoupling of ROW permissions from such connectivity clauses.

- In an event of non-feasibility of execution of underground cable laying work due to constrained/congested site conditions or any other practical difficulty, the ROW authority must have a provision to provide permission for aerial OFC laying and the rates for same should also be fixed.
- All State governments should extend the facility of right of way for laying underground Telecom cables, to all licensees without any additional payment of compensatory charges/ levies /lease rentals/ arbitrary licence fees/ requests for free bandwidth/ revenue share/ cashless equity etc.
- The RoW permission should be granted "on priority". Any denial to grant RoW in exceptional circumstances should be recorded in writing with reasons.

Q12. Should the Government consider framing guidelines to mandate compulsory deployment of duct space for fibre/ telecommunications cables and space for telecommunication towers in all major physical infrastructure construction projects such as building or upgrading highways, inner-city metros, railways or sewer networks?

Bharti Airtel's Response:

Not providing for duct space for fiber/ telecommunications cables and space for telecommunication towers in major physical infrastructure construction projects such as building or highways, inner-city metros, railways or sewer networks serves as an impediment in deployment of telecom networks. This leads to considerable delays due to numerous permissions required for laying of duct/ towers and rework on provisioning ducts/ spaces which could have been planned and executed simultaneously with little extra cost.

We therefore propose that the following Guidelines need to be mandated for Infrastructure projects:

- During development of a sector/town, all infrastructure agencies such as roads/bridges should have utility ducts provisioned to lay OFC at a later stage. All buildings/tower should be provisioned with vertical conduits for carrying out last mile building wiring for FTTH services.
- State and district development authorities shall mandate city developers and builders to integrate or provide for broadband infrastructure in their structural designs and enforce the same at the approval stage.
- Mandate placing ducts, if not optical fiber, with well-defined access mechanisms, on all new road constructions along national highways, as well as inter and intra city roads.

- RoW agencies/authorities to mark area for laying of underground cables far away from the road considering 10 years worth of expansion into consideration to save on the operators' investment and service disruption during expansion.
- In the event of road expansion by the authorities, following shall be enforced –
  1. Prior intimation to the operators for relocation of cables in defined timeline to the marked area by authorities.
  2. Strong laws including compensation should be framed for cable cut/damage by Govt. authorities/agencies or private third party agencies executing digging work.
  3. ROW shall not be charged for the said relocation
- Policy for arrangement with the power companies deploying fiber along with transmission needs.

Q13. What are the impediments to the provision of Broadband by Cable operators? Please suggest measures (including policy changes) to be taken for promoting broadband through the cable network.

Bharti Airtel's Response:

While it is important to take note of the wide reach of cable operators and the potential role they can play in the proliferation of broadband in the nation, it is important to take stock of what has prevented this from already occurring.

Cable broadband penetration the world over remains low primarily due to investments that would be required to upgrade networks to support a large number of subscribers and ensuring an acceptable quality of services while doing so.

In terms of licensing, and specifically the resale of bandwidth, cable operators would have to obtain ISP licenses and comply with associated obligations of roll-outs, payment of licence fee, lawful interception and other licensing conditions that have so far served to deter cable operators from seeking such a licence. The wide reach of cable operators should not be ignored, and we propose a franchisee model wherein hardware can be located at the cable operators' premises, to serve customers in previously untapped areas. However, associated issues such as KYC, CAF collection, and commercial considerations of the business plan merit due consideration before finalizing such a policy.

Q14. What measures are required to reduce the cost and create a proper eco system for deployment of FTTH in the access network?

Bharti Airtel's Response:

To reduce cost of deployment of FTTH in the access network, the following measures are required:

- Framing guidelines to mandate compulsory deployment of duct space for fibre/ telecommunications cables in all major physical infrastructure construction projects such as building or upgrading highways, inner-city metros, railways or sewer networks measures in respect of RoW (Refer to Q12 for detailed response)
- Allow active infrastructure for sharing of FTTH infrastructure deployed by the service providers (Details in Response to Q1).

Q15. Are there any regulatory issues in providing internet facility through Wi-Fi Hotspots? What are the reasons that installation of Wi-Fi hotspots has not picked up in the country? What type of business model needs to be adopted to create more Wi-Fi hotspots?

&

Q16. What are other spectrum bands which can be unlicensed for usage of Wi-Fi technology or any other technology for provision of broadband?

Bharti Airtel's Response:

Indian TSPs lack large spectrum holdings and therefore, Wi-Fi can offer TSPs a cost-effective means to offload data traffic, including video, which constitutes over half of all mobile internet traffic. Wi-Fi can be made available in homes, businesses and public places such as airports, hotels, malls and downtowns with relatively greater ease than prevailing alternatives. The more an operator can offload its data traffic to Wi-Fi, the greater is the speed and quality that can be made available on the mobile broadband network.

In order to promote Wi-Fi in the country, the following needs to be considered:

- Current de-licensed bands for Wi-Fi in India are different from the ITU-T & worldwide norms in ISM bands. To comply with Indian needs, vendors make India specific products that effectively increase the cost of products. Therefore, India should align itself with ISM Bands. In the 5.8 GHz band, only 50 MHz has been de-licensed vs 120 MHz available in other countries. Moreover, the 5 GHz band, which is de-licensed for Indoor Wi-Fi use, should also be made available for outdoor use with changes in the power level from 200 mw EIRP to 4 W EIRP.
- Being an un-licensed band, QoS is a limitation on Wi-Fi radio access networks. Thus, there should be no penalty on TSPs.
- Availability of power and space requirement from Hotspot Venue "Owner" in particular Public Places and Government Monuments. Continuous power is required to operate Wi-Fi access points in the network, failing which; TSPs rely on alternate power resources that impact the cost & space requirement. Hence there should be uninterrupted power supply to TSPs.

- Wi-Fi requires wireline network for its backhaul needs and consequently requires resolution of the RoW issues as detailed in our response to Q11.
- Sharing of access point & wireless LAN Controller and bandwidth should be allowed.
- Operators should be allowed proprietary authentication and security protocols for their implementation rather than forcing the selection of 802.1x based centralized authentication systems which are quite complex and user un-friendly. This severely discourages user adaptation.
- Safety and security of equipment to be ensured at the venue by treating it as public infrastructure.

Q17. How much spectrum will be required in the immediate future and in the long term to meet the target of broadband penetration? What initiatives are required to make available the required spectrum?

Bharti Airtel's Response:

Spectrum is a scarce and non-renewable resource that is fundamental to a mobile communication network. For provision of broadband using wireless networks, the requirement of spectrum increases manifold, especially with consideration to rising data growth.

The same has been witnessed the world over, with mobile data growing at exponential rates over recent years. Cisco recently confirmed this trend in their Visual Networking report with 61% compounded annual traffic growth rate between 2013 and 2018, excluding Wi-Fi offload of mobile devices. Consequently, traffic to be carried on the IMT networks alone is projected to almost double every year. This constitutes a huge challenge in terms of higher network efficiency, more base stations and substantially more spectrum to be made available for IMT.

ITU-R M.2078[5] calculated spectrum bandwidth requirement estimates (a lower and higher market settings) based on the data in Report ITU-R M.2072[6] for the future development of IMT-2000 and IMT- Advanced; predicting the requirements as three times the spectrum than in the last 20 years.

Global Demand Scenario	Total Spectrum Requirements (MHz)		
	2010	2015	2020
High Demand Setting	840	1300	1720
Low Demand Setting	760	1300	1280

Thus, the requirement of spectrum will increase manifold with the increase in penetration of mobile broadband.

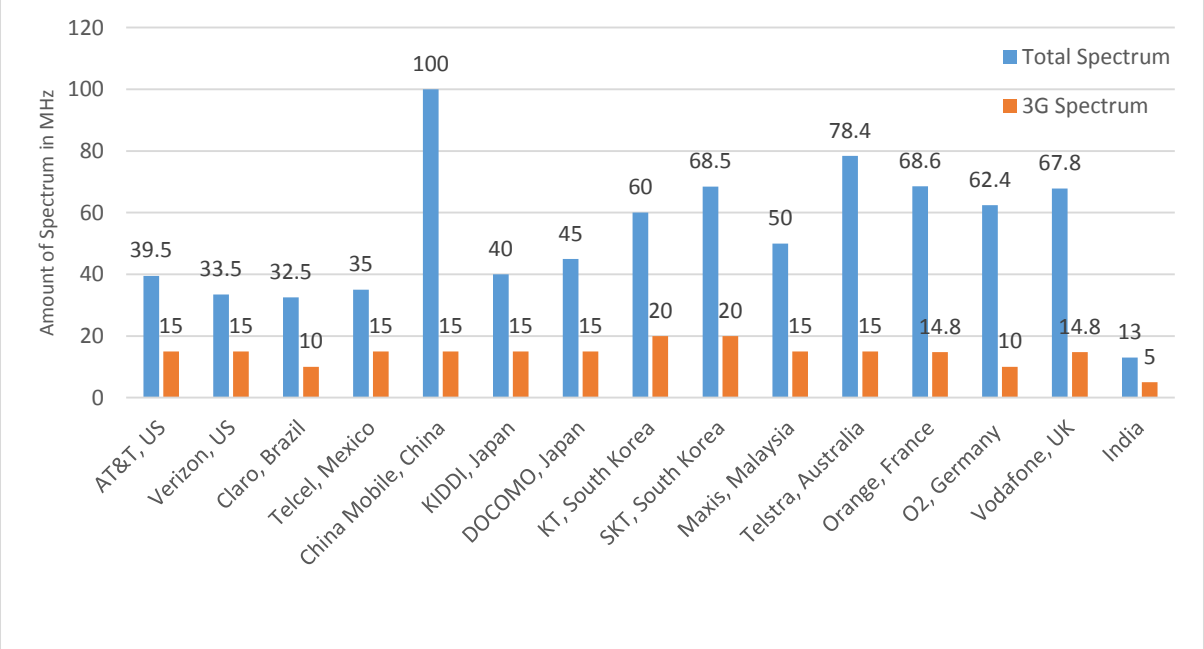
[5] ITU Report M.2078-0 (2006) titled 'Estimated spectrum bandwidth requirements for the future development of IMT-2000 and IMT-Advanced', http://www.itu.int/dms_pub/itu-r/opb/rep/R-REP-M.2078-2006-PDF-E.pdf

[6] ITU Report M.2071-0 (2006) titled' World mobile telecommunication market forecast', http://www.itu.int/dms_pub/itu-r/opb/rep/R-REP-M.2072-2006-PDF-E.pdf

In context of broadband market in India, following aspects make it unique in many ways:

- 60 million broadband subscribers, out of which 75% are wireless broadband subscribers.
- A target of 600 million broadband subscribers by 2020 implies that a majority of additional subscribers will have to be served by wireless service providers, given the limited wireline assets available in the nation.
- More than 500 million wireless broadband subscribers by 2020 & increase in data consumption of broadband subscribers is projected to have 50-60 times growth in data, resulting in more than 100% growth on Y-o-Y basis.
- More than 7 operators per circle compared to 3-4 operators in most other nations.

Operators in India have an average allocation of 2x13MHz (26MHz) compared to 2x55MHz (110MHz) available for operators in other countries.



Operators in China have access to 687MHz of spectrum[7] (refer Annexure – II for bandwise details), resulting in 230MHz of spectrum per operator. This is nine times compared to amount of spectrum available with operators in India.

The spectrum allocated for telecom service providers (per service area) in India is as follows:

Band	Amount of spectrum allocated to TSPs	Total spectrum available in the band
850MHz	2 x 15MHz	2 x 20MHz
900MHz	2 x 20MHz	2 x 25MHz
1800MHz	2 x 37MHz	2 x 75MHz
2100MHz	2 x 20MHz	2 x 60MHz

[7] GSA report on "Spectrum bandwidth requirement for IMT services in China by 2020"

2300MHz	1 x 60MHz	1 x 100MHz
Total	**244MHz**	**460MHz**

With a global average of 110MHz of spectrum per operator and considering that six operators are responsible for approximately 90% of broadband penetration in the nation, telecom service providers will require at least 660MHz of spectrum. Considering spectrum availability in China, India market will require 1380 MHz of spectrum by 2020. **In summary, there is a requirement of 400MHz – 1120MHz of additional spectrum for Indian telecom service providers in order to achieve 600 million broadband subscribers by 2020.**

Following initiatives will help in getting additional spectrum for telecom service providers for effective rollout of broadband services:

- **Harmonization of spectrum:**
  Allocation of fragmented spectrum in India has led to its inefficient usage and wastage of spectrum. Harmonization of spectrum in 800MHz, 900MHz, 1800MHz & 2300MHz will help free up an additional 40MHz of spectrum across these bands.

- **Realign spectrum allocated to the Government PSUs:**
  Few service providers are using higher amounts of spectrum in order to serve the same and in some cases even a lower number of subscribers. There is a need for reward & penalty for efficient spectrum usage, which we believe would free up an additional 5MHz for commercial use.

- **Timely allocation of available spectrum:**
  Allocation of available spectrum in 1800MHz (20 MHz), 2100MHz (10 MHz), & 2600MHz (40MHz) will help in commercializing 110MHz of additional spectrum. Such spectrum should be made available to operators at realistic reserve prices.

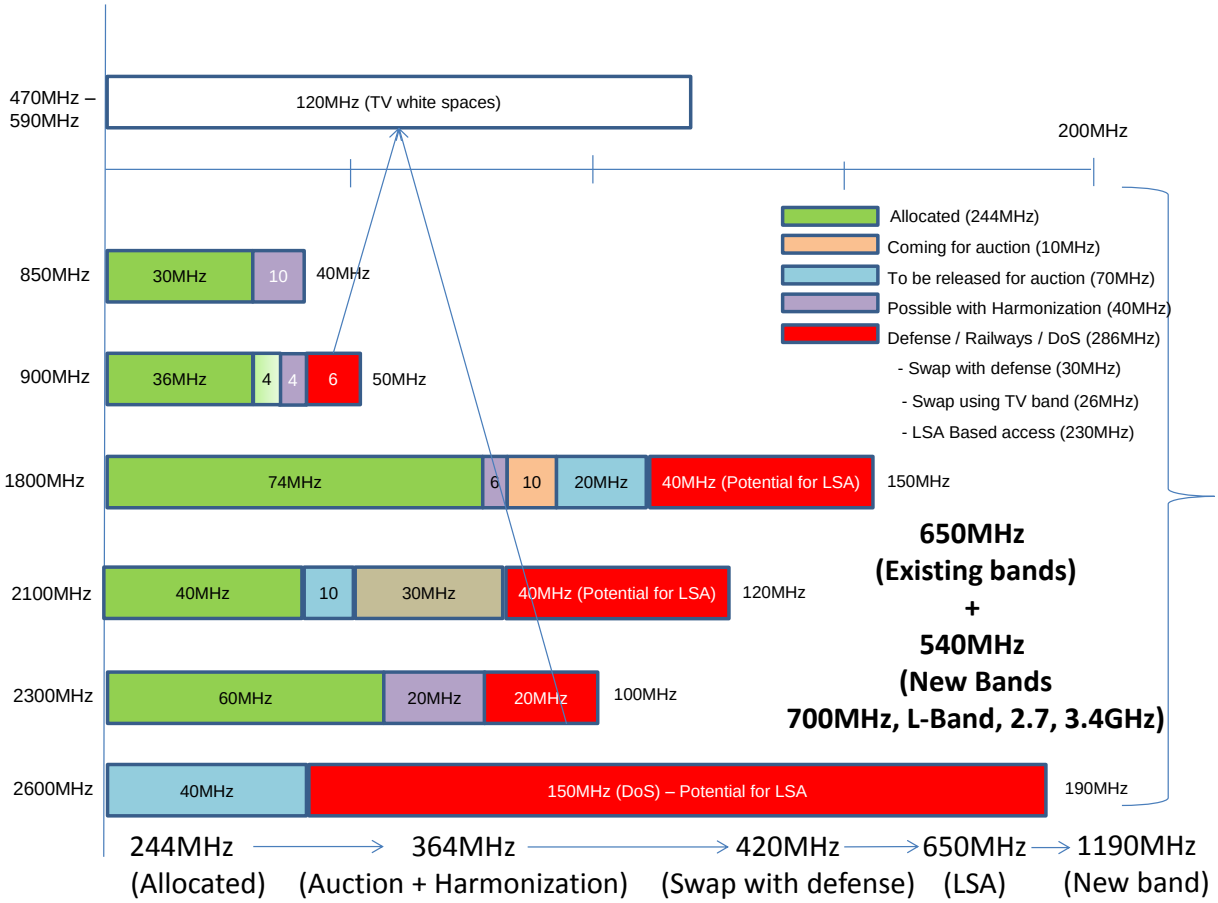
- **Swapping of spectrum with Defence:**
  Swapping spectrum held by Defence for telecom services will yield an additional 80MHz of spectrum (900MHz – 6MHz, 2100MHz – 30MHz & 2300MHz – 20MHz).

- **Licensed Shared Access (LSA) based access:**
  230MHz of spectrum earmarked for Defence & DoS (40MHz in 2.1GHz, 40MHz in 1.8GHz & 150MHz in 2.6GHz) to be made available on LSA based licensing regulations.

- **Identification of new spectrum:**
  Identification of spectrum in 700 MHz, L-Band, 2.7GHz & 3.4GHz can help in getting 450MHz of spectrum

- **Encouraging spectrum sharing, trading and removal of spectrum cap:**
  Spectrum efficiency can be improved by introducing spectrum sharing, trading across service providers. Spectrum cap should also be either removed or increased so operators are allowed to hold more spectrum.

The Spectrum roadmap proposed considering the above submissions is as follows:



Note:

- FDD spectrum is accounted as 2xFDD spectrum bandwidth whereas TDD spectrum in accounted as 1xTDD spectrum bandwidth to maintain parity,
- Spectrum mentioned above is in respect of one service area, which can be re-used in all 22 service areas with service area wise specific variations in terms of usage by defense / govt. agencies,

Therefore, 1190 MHz of spectrum availability per circle will ensure sufficient spectrum for meeting the national target of 600 million broadband subscribers by 2017

Q18. Are there any other spectrum bands apart from the ones mentioned in Chapter-2 to be identified for provision of wireless broadband services?

Bharti Airtel's Response:

GSMA has been working on the identification of new spectrum bands for mobile broadband service. In its recent recommendation to Network working group (NWG), the Joint Task Group (JTG) has submitted a list of candidate bands for the agenda item 1.1. We believe that the outcome of WRC-15 agenda item 1.1 will be the single most important factor determining the future availability of affordable, ubiquitous, high-speed mobile broadband services.

By agreeing on new internationally harmonized mobile bands, WRC-15 will also drive the market for low cost mobile devices, enable roaming, and minimize cross-border interference. The recent recommendations include four frequency bands to be included in the IMT standards, which is being supported by members at large. These are suitable for new allocations to the mobile service widely around the world on a co-primary basis and/or identification for IMT where the primary allocation already exists. These are:

- 1350-1400MHz and 1427-1518MHz (L-Band)
- 470-698MHz (Sub-700MHz)
- 2.7-2.9GHz
- 3.4-4.2GHz (C-Band)

Apart from the above bands, the Indian Government has also made a submission to the ITU for allocation of some additional bands to meet the requirements of mobile broadband in the future. These include 1429-1518 MHz, 2025-2110 MHz, 2200-2290 MHz, 4400-4500 MHz & 4800-50000 MHz. A copy of this submission is enclosed as Annexure – III.

Q19. What are the measures required to encourage Government agencies to surrender spectrum occupied by them in IMT bands?

Bharti Airtel's Response:

Spectrum between 400 MHz and 4 GHz is best suited for mobile applications as lower bands would require antennas that are simply too large to be integrated into mobile devices, and higher bands would limit cell sizes. This entire range of "good" spectrum, however, has been found to be allocated to a number of different services and technologies, such as broadcast, aeronautical, satellite, defense, public safety and other commercial and non-commercial services; many of which do not utilize the spectrum intensively. In context of the current allocations of spectrum in India, spectrum in key bands being currently occupied by Government agencies is as follows:

Band	Amount of spectrum per circle (not available for TSPs)	Total spectrum across India	Usage / Earmarked
900MHz	2 x 1.2MHz – 2 x 4.8MHz	2 x 66MHz (Approx.)	Defense / Railways
1800MHz	2 x 20MHz	2 x 440MHz	Defense
2100MHz	2 x 35MHz	2 x 770MHz	Defense
2300MHz	20MHz	440MHz	Defense
2600MHz	2 x 75MHz	2 x 1650MHz	DoS
Total	**2 x 143MHz**	**2 x 3146MHz**	**Defense / DoS**

In summary, more than 140MHz of paired spectrum recognized by IMT standard for broadband services is being used by or earmarked for use by government agencies. In addition, the network rolled out by the agencies is only in specific cities or part of the city and does not have need for ubiquitous network rollout in cities / circles. On the other hand, telecom services providers are deprived of this spectrum for coverage & capacity enhancement of the broadband networks across wider geographical areas. It is therefore recommended that this spectrum be surrendered back from the government agencies by creating a fallback plan as follows:

- **Spectrum swap with defense in 2.1GHz band**
  15MHz of additional spectrum can be vacated by defense through swapping of spectrum in 1900-1907.5MHz (paired with 1980-1987.5MHz). This will make available three additional spots of spectrum for 3G deployment, which currently accounts for 75% of the total broadband subscribers in the country.

- **Allocation of spectrum in UHF band (470MHz – 590MHz)**
  Spectrum earmarked or being used in 900MHz & 2300MHz be traded for spectrum in UHF band, which can free up 2x15MHz of spectrum for telecom services. This will provide significant coverage enhancements for deployment of networks by the agencies, reducing the Capex & Opex for these networks. In addition, use of this band can provide exclusivity and additional security for use by defense / railways.

- **Subsidizing the cost of new re-deployment of private networks**
  'Clearing the spectrum' is one straightforward way to free up more exclusive spectrum for mobile broadband use. This has been best practice over the years, and will continue to be the preferred option for cellular mobile networks. In most cases, however, clearing spectrum requires significant investment and/or lengthy development time. Cost of such re-deployments can be subsidized by using portion of proceeds from spectrum auction of the "freed up" spectrum. However, such benefit should come with a condition of vacating the spectrum in a time bound manner failing which spectrum held may also be accounted for at the fair value in budgetary allocations.

- **Licensed Shared Access (LSA) in 1800MHz, 2100MHz & 2300MHz**

  While "Clearing of spectrum" is the most common and preferred practice, recently promoted Licensed Shared Access (LSA) is an alternative and efficient means to gain at least partial access to additional spectrum resources for IMT use. Licensed Shared Access (LSA), also known as Authorized Shared Access (ASA), is a new regulatory concept that allows license holders (incumbents) to share spectrum with other service providers, under well-defined conditions and provide a predictable quality of service. The purpose of LSA is not to replace the traditional exclusive access but to enable sharing of spectrum with non-telecom service provider incumbents. LSA is a valuable spectrum optimization concept, as it aims to balance the needs of legacy spectrum users with those of operators, and it enables timely availability and licensed use of harmonized spectrum with predictable QoS. A major benefit envisioned with LSA is that the number of LSA licensees is limited, and certain spectrum band in the specific region at certain time duration is only authorized to one LSA licensee. The LSA licensee can use the spectrum exclusively with the sharing conditions fulfilled.

  LSA is a regulatory approach that is technology neutral. It does not restrict any access technologies, and provides enough flexibility to adapt to different marketing needs. LSA can unlock additional spectrum, especially bands already identified by IMT, however, in some regions or countries the band is not obtainable for IMT use in reasonable time due to incumbent use. Since, these bands are already global harmonized bands with good support from the industrial ecosystem and sharing commonalities on coexistence globally, the benefits of opening these bands via LSA is obvious on boosting economic scale and reducing the costs of providing services.

  LSA based access to telecom service providers will provide access of 2 x 50MHz of spectrum in 1800MHz, 2100MHz & 2300MHz band.

- **Use of additional spectrum in 3.4GHz – 4.2GHz for DoS**

  2x75MHz of spectrum has been earmarked for DoS in 2.6 GHz band, which is the widely deployed TDD band in China market. China Mobile is rolling out its complete LTE network in this band and has more than 400K base stations deployed in more than 400 cities across China, serving more than 20 million subscribers on this network. With this as an influence, LTE TDD has its widest ecosystem in this band. This band should be thus harmonized for broadband network deployment in India, and hence spectrum in this band should be made available for telecom service providers.

  In lieu of this, additional spectrum in 3.4GHz – 4.2GHz should be made available for DoS for launch of satellite services.

Q20. What should be the time frame for auctioning the spectrum in 700 MHz band?

Bharti Airtel's Response:

The 700 MHz band spectrum has much better propagation characteristics as compared to the BWA 2300 MHz spectrum that was auctioned in 2010. Thus, it can be a crucial band as we expand broadband into the rural parts of the country.

However, when timing the auction of any spectrum band it is important to balance the need for the spectrum with the development of the local ecosystem of network and devices for that band. Not taking the ecosystem evolution into account can lead to underutilization of the spectrum and to blocking of funds by operators which could have otherwise been spent on expanding network deployment. This was observed to a large extent in the 2300 MHz auction of 2010 wherein this band still continues to be unutilized due to lack of the requisite ecosystem. Had these investments been made in mature bands such as 800/900/1800/2100 MHz, it could have led to a faster expansion of broadband networks across the country.

In this context, the APT 700 MHz band being adopted in India too lacks the device ecosystem necessary for its adoption. At present only seven commercial LTE networks have been deployed in Taiwan, Australia & New Zealand and only 33 devices have been announced by 11 manufacturers. In such a scenario, an early auction of this band will lead to a situation wherein the spectrum will be underutilized for several years and investments will not flow into network expansion.

Therefore, it is suggested that DoT/TRAI should initiate the auction of this band only after the ecosystem in India matures for this band. Instead, we believe that the Government should make efforts to make much larger amount of spectrum available in bands such as 800MHz, 900MHz, 1800MHz and 2100 MHz which will serve the goals of broadband expansion better.

Q21. Do you agree with the demand side issues discussed in Chapter 5 and Chapter 6? How these issues can be addressed? Please also indicate any other demand side issues which are not covered in the CP.

Bharti Airtel's Response:

- In order to meet Broadband targets, addressing supply-side constraints are important, but demand side considerations are equally vital. If the socio-economic benefits of broadband are to be realized, then adoption needs to be actively encouraged. Adoption increase will need to factor in issues of perceived utility, availability of useful applications/ usage, connectivity, content in local language, affordability (Low CPE cost and low tariff), easy access, dependable availability of service etc.

- The need of the hour is to endeavor to provide urban like facilities/ opportunities to villagers without actually urbanizing them. Broadband can significantly contribute to this endeavor by providing access to enormous information, employment generation, better medical facilities and business opportunities to the rural population. Presently, more than 60% broadband subscribers reside in the top ten metros / tier-I cities and more than 75% connections belong to the top 30 cities. Low broadband penetration in non- top tier areas, itself will be viewed as a market opportunity provided systematic imperatives are made to fuel demand so operators have demand led reasons to provide coverage rather than fulfilling an obligation. This would also mean that innovative business models will have to be encouraged so as to provide a fillip for the provision of services in a commercially sustainable manner.

- Besides basic infrastructure, rural and remote areas suffer the largest deficit and cost for access to government provided services. Ability to access government related services through e-governance initiatives would fuel demand for broadband services to access the same. Therefore there is need to hasten the action steps for the following objective and strategy recognized in NTP'12:

  - Enable citizens to participate in and contribute to e-governance in key sectors like health, education, skill development, employment, governance, banking etc. to ensure equitable and inclusive growth.
  - To promote synergies between roll-out of broadband and various Government programs viz e- governance, e-panchayat, MNREGA, NKN, AADHAR, low cost CPEs/ devices etc.

- For encouraging the stakeholders to play an active and vital role in mobile broadband growth, following additional measures are suggested in addition to operationalizing NTP'12 strategies:

- **Availability of affordable devices:**
  - ✓ Even though the cost of handsets has fallen significantly, rural households may still perceive mobile handsets or access devices to be expensive.
  - ✓ Therefore, the bundling of handsets should be encouraged and receipts from sale of handsets, accessories, etc. should not be included in AGR if it is not a part of bundled scheme.
  - ✓ Tax relief in terms of custom duty, import duty should be considered in order to reduce the cost of CPE imported in the country.

- **Availability of digital content:**

- ✓ It is essential to provide the right kind of application to the right customer. This is possible by developing applications and content that is relevant, usable and understandable by the local population.
- ✓ To enable this, Government supported initiatives would be extremely important. This should include mandating of m-governance for all Government Departments. This will help drive the demand for Broadband, thus helping the business case for operators to rollout networks and coverage.
- ✓ Hassle free financial support and incentivize funding to entrepreneurs and service providers to help them generate and maintain localized packaged content in various regional languages, set up e- learning and awareness centres and to connect rural masses to the main stream through broadband.
- ✓ It is also important to change the perception amongst users, especially in rural areas that accessing internet is only associated with computers.

Annexure I – Cost model for fixed broadband technologies

Modelling Basis 800 Home Passes - High Rises						
Particulars	CPE	Subscriber Access	Last Mile Access	ISP - CO	Per Home Pass Cost	Per Connected Home
Technologies	ONT & RG	Incl Drop Wire	Incl Row & ODN	Incl OLT & Infra	Rs	Rs
ADSL	1,500	2,200	6,500	2,600	12,800	26,450.00
VDSL	3,500	2,200	6,500	2,600	14,800	28,450.00
FTTH	6,000	2,600	5,000	3,200	16,800	29,100.00
Utilization	100%	100%	40%	40%		
Modelling Basis 800 Home Passes - Flat Bed or SFU						
Particulars	CPE	Subscriber Access	Last Mile Access	ISP - CO	Per Home Pass Cost	Per Connected Home
Technologies	ONT & RG	Incl Drop Wire	Incl Row & ODN	Incl OLT & Infra	Rs	Rs
ADSL	1,500	2,200	9,000	2,600	15,300	32,700.00
VDSL	3,500	2,200	9,000	2,600	17,300	34,700.00
FTTH	6,000	2,600	8,000	3,200	19,800	36,600.00
Utilization	100%	100%	40%	40%		

Annexure – II: Spectrum availability for commercial mobile use in China

Operators in China have access to 687MHz of spectrum as indicated in table below:

Duplex Mode			**Lower Bound (MHz)**	**Upper Bound (MHz)**	**Bandwidth (MHz)**	**Total (MHz)**
2G	FDD	UL	889	915	26	**162**
		DL	934	960	26	
		UL	1710	1755	45	
		DL	1805	1850	45	
		UL	825	835	10	
		DL	870	880	10	
3G	TDD	Un-paired	1880	1920	40	**155**
		Un-paired	2010	2025	15	
		Un-paired	2300	2400	100	
	FDD	UL	1920	1980	60	**180**
		DL	2110	2170	60	
		UL	1755	1785	30	
		DL	1850	1880	30	
LTE	TDD	Un-paired	2500	2690	190	**190**
Total						**687**

Radiocommunication Study Groups

Received: 15 July 2013

Document 4-5-6-7/xxx-E
July 2013
English only

India (Republic of)

Input to studies towards WRC-15 Agenda item 1.1

Suitable frequency ranges for IMT for deployment of mobile broadband

1. Introduction

India, in its National Telecom Policy 2012 (NTP-2012)[1], has envisioned leveraging telecom infrastructure for "Broadband on Demand" and for making it a reality recognising that this growth is possible with IMT services. NTP 2012, therefore, highlights the need of adequate availability of spectrum with a target of making available additional 300 MHz spectrum for IMT services by the year 2017 and another 200 MHz by 2020.

2. Suitable Frequency Ranges

WP5D meetings have already studied various spectrum characteristics based on which spectrum can be identified for its right usage for IMT and mobile broadband. These characeritics are as follows -

a. **Coverage spectrum**
   i. Favorable propagation characteristics, possibly leading to less equipment and lower cost.
   ii. Indoor penetration.
   iii. Large geographic areas.
   iv. Low populations density.
   v. Rural coverage.
   vi. Rollout of overlay networks.
   vii. Categorized by cell size (>5km).
   viii. Primarily frequency ranges below 1GHz.

b. **Capacity spectrum**
   i. Large bandwidths.
   ii. Wider channel bandwidths.
   iii. Multiple times 5 MHz.
   iv. Areas of high population density.
   v. Categorized by cell size (0.5-5km) or broad range (1-3 GHz)

[1] http://www.dot.gov.in/ntp/NTP-06.06.2012-final.pdf

c. **Performance**

i. Higher bit rates/very high peak data rates.
ii. Coverage and capacity for indoor use/high-rise buildings.
iii. Hotspot coverage.
iv. Accommodating densification of cell sites.
v. Categorized by cell size (<500m) or broad range (> 3 GHz)

d. **Continuous/Contiguous/Adjacent**

i. Expansion of existing identified spectrum.
ii. Potentially reducing equipment modifications (and thereby costs)

e. **Harmonization (Global/Regional)**

i. Facilitating roaming.
ii. Reducing equipment complexity.
iii. Increasing economies of scale

3. Due to existing allocation of fixed, mobile and satellite based services, making available all identified frequency ranges for IMT in a short/immediate term will be impractical. Opening of any frequency band will depend on priority of need, availability of spectrum, and market dynamics.

4. Accordingly based on these factors, following frequency ranges along with their characteristics have been identified for sharing and compatibility studies to be carried out by JTG4-5-6-7

Table-1

Ser No.	Frequency Range	Coverage	Capacity	Performance	Contiguous	Harmonization
1.	1429-1518 MHz	√	√			√
2.	2025–2110 MHz		√		√	√
3.	2200-2290 MHz		√		√	√
4.	4400-4500 MHz		√	√		
5.	4800-5000 MHz		√	√		

5. Proposal

India proposes necessary sharing and compatibility studies of frequency ranges as above in Para 4.

_____