Bharti Airtel Ltd.
India & South Asia
Airtel Center, Plot No. 16,
Udyog Vihar, Phase - IV,
Gurugram - 122 015
Haryana, India

www.airtel.in
Call +91 124 4222222
Fax +91 124 4243252

TRAI/FY23-24/21
Dated: 01.06.2023

To,
Shri Akhilesh Kumar Trivedi,
Advisor (Network, Spectrum and Licensing)
Telecom Regulatory Authority of India,
Mahanagar Door Sanchar Bhawan,
JawaharLal Nehru Marg,
New Delhi – 110 002.

Subject: Response to Consultation Paper on "Assignment of Spectrum for Space-based Communication Services"

Dear Sir,

This is in reference to TRAI's Consultation Paper on "Assignment of Spectrum for Space-based Communication Services" dated 06.04.2023 (CP No. 6/2023).

In this regard, please find enclosed our response for your kind consideration.

Thanking You,

Yours' Sincerely,
For Bharti Airtel Limited

Manoj Misra
Vice President- Economic Regulation

Encl: a.a

Response to TRAI Consultation on
Assignment of Spectrum for Space-based Communication Services

Preamble

Airtel welcomes the Authority's consultation paper ("CP") on "*Assignment of Spectrum for Space-based Communication Services*". The CP assumes greater importance, especially since the Government of India (the Department of Space or "DoS") has just published its New Spacecom Policy 2023[1] to enable private sector participation in the domain of Indian space activities. We view this Policy as an important stepping stone to achieve **the Hon'ble Prime Minister's vision of a Digital India where** every individual, in every corner of the country, should have access to reliable connectivity.

The recommendations coming out of **this CP, therefore, should seamlessly complement the Hon'ble Prime Minister's vision and Space Policy 2023** to provide satellite-based services such that India becomes a pioneer in the field and facilitate space start-ups. The entire bedrock of the Digital India platform is 'connectivity' and a true Digital India will only arrive when there is robust and seamless connectivity for each and every one of us. **Satellite communications is a tested and viable solution for connecting the unconnected with broadband in rural/remote/mountainous terrains, disaster-prone areas and to meet the strategic requirements of defense, maritime and disaster recovery.**

In this context, it is Airtel's firm belief that auctioning the satellite spectrum is neither reasonable nor just or fair. The reasons for this are explained below:

1. **Satellite spectrum is a shared resource:** In satellite, the same spectrum is used by multiple users. That is how it is treated, operated, and assigned globally and that is what enhances its utility. In an auction-based scenario, the de facto principle would be that this spectrum is exclusive – in other words, not to be shared. In case it is mandated to be shared post-auction, the very logic of auctioning it would be questionable.

2. **Globally, satellite spectrum is assigned on administrative** basis because:
   a) satellite spectrum is given on a non-exclusive basis, and
   b) it is considered a shared resource, requiring global coordination.

   Even jurisdictions such as the US and UK that have been auctioning terrestrial spectrum for decades do not auction satellite spectrum. In the handful of countries where auctions were attempted, they have been unsuccessful. Furthermore, the auction of orbital slots done in a few countries should not be confused with the auction of spectrum for satellite services.

3. **Auctioning spectrum can distort the utility of satellite spectrum:** Each satellite constellation uses a specific spectrum band which is assigned for use globally. Thus, a typical LEO system cannot operate with different spectrums bands in different parts of the world. A corollary from the previous point is that in an auction-based scenario, competitive forces can block spectrum capacity/hoard it. This will lead to non-utilisation in areas where another operator (who has a global assignment for the same spectrum) could have used it. This will severely constrain the available capacity for satellite services. For instance, a LEO operator requires spectrum in the entire band failing which it will not be able to utilize its constellation completely and provide seamless services.

4. **Non-exclusivity and auctions do not go together**: The auction inherently means it comes with exclusivity. However, satellite spectrum is a shared resource and non-exclusive and hence there are no global examples of satellite spectrum being assigned on a exclusive basis or based on auction-based approach.

[1] India Space Policy- 2023. https://www.isro.gov.in/media_isro/pdf/IndianSpacePolicy2023.pdf

5. **Auctioning spectrum and then creating a sharing mechanism is self-defeating. It is akin to bringing an intermediary between the spectrum licensor and user licensee**: There is no need to create a middle-entity (an intermediary) between the spectrum licensor, i.e., the WPC/DoT and the spectrum user, i.e., the satellite operators. Such an intermediary will have to initially buy the spectrum from DoT and then, through a mandatory sharing mechanism, offer the same spectrum to actual satellite spectrum users. This will bring in needless complexities since user satcom players will have to stitch multiple sharing arrangements together with different spectrum winners/ owners. Both situations are entirely unnecessary when there is a perfectly simple solution available where the user satellite players can reach out directly to DoT for operating in that shared band. Also a scenario may merge wherein the players may not agree on sharing, in which case not only will the roll out of services may get impacted, but would also lead to inefficient use of spectrum.

6. **Auctioning satellite spectrum can severely impact wider socio-economic welfare**: Auctioning satellite spectrum will likely only capture excessive producer surplus, and not as much consumer surplus, failing to provide any benefit externally in terms of the wider socio-economic gains that satcom can provide in terms of connecting the unconnected. Inspite of nearly 3 decades of terrestrial spectrum roll-out, vast areas and critical locations remain uncovered and bereft of Digital inclusion & services. Satellite offers and unique opportunity to not only cover such areas but also provide backhaul to terrestrial players to further their reach into such non-feasible areas.

7. **India will be left at a competitive disadvantage versus global / other countries**: The auction of satellite spectrum in India will put Indian players at a disadvantage in comparison to the global competing operators who simply pay an administrative fee for the resources required for providing the same service in their / other global markets. It will raise the cost for Indian satellite players in India, while also making Indian satellite bandwidth expensive relative to international markets who do not follow the same/a similar approach.

8. **Auctioning could result in a persistent digital divide:** Auctioning satellite spectrum might lead to a digital divide, wherein only the highest bidders will be able to provide services, resulting in higher costs for consumers and limited accessibility, particularly in the rural and economically disadvantaged areas, where satellite communication could be particularly beneficial. Administrative allocation can help prioritise affordable and accessible services that will promote digital inclusion. This approach would also align with the objective of the NDCP.

9. **The Supreme Court Judgment didn't mandate auction as the sole method in every case**: The Hon'ble Supreme Court Order was in the context of arbitrary grant of terrestrial spectrum for exclusive usage. However, space-based communication is non-exclusive by its very nature and hence the SC order cannot be extrapolated to the satellite spectrum. The detailed response to this is provided in response to Q14.

10. **The propensity to pay should be proportionate to the revenue generation ability of a segment**: A further corollary from the last point is that the paying propensity of a satellite communication operator cannot be compared to the paying propensity of a terrestrial operator. Therefore, the generally accepted practice is to value an asset in proportion to the revenue from the asset. Hence, the pricing will need to factor that in. To that extent, it must be noted that assigning spectrum on a non-auctioned, i.e., administrative basis does not mean that spectrum is not being paid for, rather an auction is an erroneous method to ascertain its price.

11. **Auctioning will create multivariate scenarios and too many complexities, making the exercise infeasible.** Unlike terrestrial spectrum where there has been some precedence in terms of the various bands in India as well as globally due to auctions, there is neither any precedent, nor any clarity about the market size for satcom. Estimating it is not going to be an easy task either. There are too many variables at play. Some of these include:

    a. What is the market size and how does one estimate it?
    b. Is it 1%, 5%, 10% or just a substitute for an entire terrestrial base? Is that a logical assumption? Theoretically, it can at best be a fraction of India's population.
    c. Even here, will it serve only the rural/remote areas and some very niche requirements like maritime / disaster support?
    d. What will be the Average Revenue Per User (ARPU) for Satcom? To be competitive against terrestrial it must match the terrestrial ARPU of ~$2.5.
    e. Are there devices available in the market that can/will support consumer uptake? How many years will it take to reach even, say, 1% of the Indian population?

    Any spectrum valuation cum pricing decision on satellite spectrum must reflect on these and other related issues. A task which will not be easy. If any of the assumptions were to be even slightly askew, it could disturb the entire business case/utility of satcom.

12. **Auctioning spectrum will have a detrimental impact on startups and preempt competition:** Auction-based spectrum allocation may discourage new startups and smaller players from entering the market due to the high initial costs and price of providing space-based communications due to high cost of equipment and other associated logistics such as launch vehicles etc. Administrative allocation can foster innovation by encouraging a diverse range of players, including startups, to access spectrum at lower costs and by ensuring a level playing field for all participants, regardless of their financial capabilities. Fostering a competitive environment with lower barriers to entry will promote the growth of the space-based communication sector, supporting the expansion of the Indian startup ecosystem.

Airtel is concerned that auctioning the satellite spectrum and creating an exclusiveness will create barriers for competition as competitors may block access to it by bidding and winning partial or full spectrum inspite of having no such global allocation, and make satellite systems redundant and severely hamper the emerging space ecosystem in the country. This could be avoided by using the globally accepted (administrative) allocation method. The TRAI mandate is to ensure orderly growth of the sector and the space communications industry needs the TRAI vision and support to make space economy a reality in the country.

The allocation of spectrum for space-based communication services is a crucial issue in India. As highlighted above, auctioning this spectrum could result in any number of negative outcomes including an unmitigated digital divide, reduced competition, unfavourable environment for startups and unaffordable costs. Hence an administrative allocation approach should be considered since it would promote a more equitable, accessible, and competitive ecosystem, guided by international best practices.

By adhering to International Telecommunication Union (ITU) guidelines and international best practices, India can ensure a balanced and inclusive approach to spectrum allocation for space-based communication services while same time stepping itself to compete in global space race.

In addition, it is critical to ensure that the eligibility criterion for spectrum for space-based communication should prevent speculative and spurious applicants by ensuring necessary threshold of applicants to launch and operate a satellite. The criteria should include following the global ITU priority, holding a valid license, and other such necessary techno-commercial aspects (e.g., a constellation ready to provide service).

In view of the above, Airtel recommends that spectrum for space-based communication services be allocated based on administrative approach. Further, the Authority should recommend suitable qualifying criterion to ensure the prompt and efficient usage of spectrum.

In summary:

- *Satellite communication has the potential to bridge the digital divide by covering hitherto uncovered, remote areas, while serving the country's disaster, maritime and defence needs.*
- *Allocation of spectrum for space-based communications should complement the vision embedded in the India Space Policy 2023 & encourage private sector participation.*
- *Spectrum for space-based communication is a shared resource, whose utility increases upon sharing. A non-exclusive approach will help ensure space-based start-ups in India are also able to create satellites and solutions at prices competitive in the global market.*
- *Globally, satellite spectrum has been assigned on a non-exclusive (i.e. shared) and administrative, basis. The same international approach now needs to be applied in India, horizontally, for all space-based communication services.*
- *India has followed the international best practices for allocation of terrestrial spectrum that has held it in good stead for over a decade now. By following similar best practice as is applicable for Space based communications viz. non-exclusive, administrative allocation of satellite spectrum, India can immensely benefit from satellite technology.*
- *Any attempt at auctioning spectrum (exclusively or non-exclusively) for space-based communications is fraught with the risk of adjusting for multiple variables, complexities, that may force the creation of ex-ante interventions like mandatory sharing to mitigate these risks or possible competitive concerns.*
- *Auctioning spectrum for space-based communications will put India and Indian satellite players including the start-ups at a competitive disadvantage vis a vis global countries and satellite players, as the cost of operating will be higher.*
- *The spectrum for space-based communications should continue to be assigned on administrative basis, in line with international practice, consistent with ITU rules & regulations. The period of spectrum should be co-terminus with the period of license.*
- *In the spirit of Space Reforms, no charges for spectrum usage be levied. However, if the Authority still considers imposing a spectrum usage charge, then it should be within 0.5%-1% of AGR at the maximum, to recover the cost of administering the spectrum.*
- *The eligibility criterion for getting spectrum for space-based communication should follow the global ITU priority, holding a valid license, and other necessary techno-commercial aspects (e.g., a constellation ready to provide service).*

We now proceed to provide question-wise responses.

Response to TRAI Consultation on
Assignment of Spectrum for Space-based Communication Services

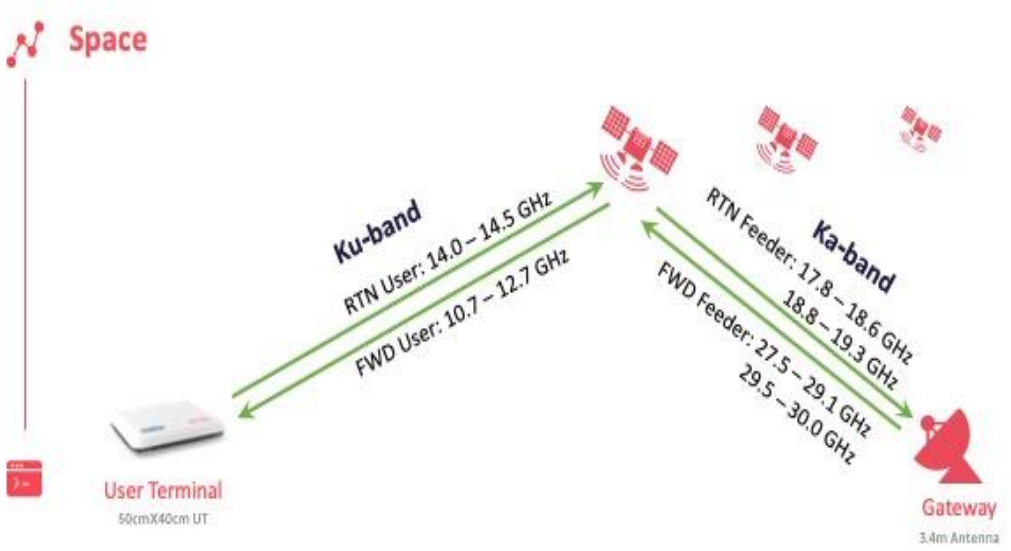
Q1. For space-based communication services, what are the appropriate frequency bands for (a) gateway links and (b) user links, that should be considered under this consultation process for different types of licensed telecommunications and broadcasting services? Kindly justify your response with relevant details.

Airtel Response:

The allocation of spectrum for satellite services is governed by international treaties and agreements, established by the ITU, so coordination at a global level is critical for their provision.

Therefore, the frequency bands for space-based communications services should continue to be governed based on International Telecommunications Union's Radio Regulations ("ITU RR"). In fact, DoT itself uses the ITU RR as the basis of the National Frequency Allocation Plan (**"NFAP"**).

Typically, the OneWeb satellite systems uses the following spectrum:



Q2. What quantum of spectrum for (a) gateway links and (b) user links in the appropriate frequency bands is required to meet the demand of space-based communication services? Information on present demand and likely demand after about five years may kindly be provided in two separate tables as per the proforma:

Type of service	Name of the satellite system	Type of satellite e (GSO/ LEO/ MEO)	Frequency range and quantum of spectrum required							
			User Link (Earth to space UL)		User Link (Space to Earth DL)		Gateway Link (Earth to space UL)		Gateway Link (Space to Earth DL)	
			Frequency range	Qua ntu m (in	Frequency range	Qua ntu m (in MH	Frequency range	Qua ntu m (in	Frequency range	Qua ntu m (in
Access										

Internet										
NLD										
ILD										
GMPCS										
VSAT CUG (Commercial)										
Captive VSAT CUG										
Machine to Machine (M2M)										
DTH										
Teleport										
DSNG										
HITS										
IFMC										
Any other relevant service (please specify)										

Airtel Response:

To provide seamless and high-quality satellite communication services, the new generation of OneWeb's LEO satellite design requires access to the full Ku-band and Ka-band spectrum on a sharable basis. Any restricted or partial access of the full band would lead to gaps in coverage which would negatively impact the end-users who depend on these satellite services.

Given that the Indian Government has just opened the Space communication segment for private participation, it may be somewhat premature to identify and segregate satellite/space spectrum into various service-based categories. Furthermore, the satellite spectrum has always been a shared resource within which multiple users operate efficiently.

Therefore, segregating the satellite frequency based on service segregations and their usages is not a practical exercise, and prospectively estimating the quantum of spectrum required for each type of service will prove a further challenge. In other words, the quantum of spectrum for various services cannot be prescribed.

It is Airtel's recommendation that the similar approach need to be applied horizontally for spectrum requirement across all types of space-based services including satellite communications, DTH, Teleport, V-SAT etc.

Q3. Whether there is any practical limit on the number of Non-Geo Stationary Orbit (NGSO) satellite systems in Low Earth Orbit (LEO) and Medium Earth Orbit (MEO), which can work in a coordinated manner on an equitable basis using the same frequency range? Kindly justify your response.

Airtel Response:

The practical limit on the number of NGSO satellite systems in LEO and MEO, which can work in a coordinated manner using the same frequency range, would be governed as per the International Telecommunication Union ("ITU") coordination rules.

While research is ongoing on space sustainability issues, it is important to ensure that the coordination mechanism prescribed under the ITU-RR is followed by all satellite systems. This will ensure smooth interference mitigation under the current framework.

Q4. For space-based communication services, whether frequency spectrum in higher bands such as C band, Ku band and Ka band, should be assigned to licensees on an exclusive basis? Kindly justify your response. Do you foresee any challenges due to exclusive assignment? If yes, in what manner can the challenges be overcome? Kindly elaborate the challenges and the ways to overcome them.

Airtel Response:

No, the frequency spectrum for space-based communication services in higher bands, such as C band, Ku band and Ka band, should not be assigned to licensees on an exclusive basis.

At the outset, it is critical to understand the difference between an exclusive resource and its need vis a vis shared resources and their needs. Kindly refer to the preamble, wherein a detailed justification has already been provided on as to why it is **important to ensure that satellite spectrum remains a non-exclusive and shared resource**. We reiterate:

1. **Satellite spectrum is a shared resource:** In satellite, the same spectrum is used by multiple users. That is how it is treated, operated, and assigned globally and that is what enhances its utility. In an auction-based scenario, the de facto principle would be that this spectrum is exclusive – in other words, not to be shared. In case it is mandated to be shared post-auction, the very logic of auctioning it would be questionable.

2. **Globally, satellite spectrum is assigned on administrative** basis because:
   a) satellite spectrum is given on a non-exclusive basis, and
   b) it is considered a shared resource, requiring global coordination.

   Even jurisdictions such as the US and UK that have been auctioning terrestrial spectrum for decades do not auction satellite spectrum. In the handful of countries where auctions were attempted, they have been unsuccessful. Furthermore, the auction of orbital slots done in a few countries should not be confused with the auction of spectrum for satellite services.

3. **Auctioning spectrum can distort the utility of satellite spectrum:** Each satellite constellation uses a specific spectrum band which is assigned for use globally. Thus, a typical LEO system cannot operate with different spectrums bands in different parts of the world. A corollary from the previous point is that in an auction-based scenario, competitive forces can block spectrum capacity/hoard it. This will lead to non-utilisation in areas where another operator (who has a global assignment for the same spectrum) could have used it. This will severely constrain the available capacity for satellite services. For instance, a LEO operator requires spectrum in the entire band failing which it will not be able to utilize its constellation completely and provide seamless services.

4. **Non-exclusivity and auctions do not go together**: The auction inherently means it comes with

exclusivity. Mobile operators require exclusive access to a portion of a frequency range. However, satellite spectrum is a shared resource (where several satellite operators can share the entire range of spectrum) and non-exclusive and hence there are no global examples of satellite spectrum being assigned on a exclusive basis or based on auction-based approach.

5. **Auctioning spectrum and then creating a sharing mechanism is self-defeating. It is akin to bringing an intermediary between the spectrum licensor and user licensee**: There is no need to create a middle-entity (an intermediary) between the spectrum licensor, i.e., the WPC/DoT and the spectrum user, i.e., the satellite operators. Such an intermediary will have to initially buy the spectrum from DoT and then, through a mandatory sharing mechanism, offer the same spectrum to actual satellite spectrum users. This will bring in needless complexities since user satcom players will have to stitch multiple sharing arrangements together with different spectrum winners/ owners. Both situations are entirely unnecessary when there is a perfectly simple solution available where the user satellite players can reach out directly to DoT for operating in that shared band. Also a scenario may merge wherein the players may not agree on sharing, in which case not only will the roll out of services may get impacted, but would also lead to inefficient use of spectrum.

6. **Auctioning satellite spectrum can severely impact wider socio-economic welfare**: Auctioning satellite spectrum will likely only capture excessive producer surplus, and not as much consumer surplus, failing to provide any benefit externally in terms of the wider socio-economic gains that satcom can provide in terms of connecting the unconnected. Inspite of nearly 3 decades of terrestrial spectrum roll-out, vast areas and critical locations remain uncovered and bereft of Digital inclusion & services. Satellite offers and unique opportunity to not only cover such areas but also provide backhaul to terrestrial players to further their reach into such non-feasible areas.

The DoT's reference to TRAI on Space spectrum and, consequently, many related questions of extant CP come from the perspective of terrestrial spectrum auctioning procedures that assign spectrum to IMT services on an exclusive basis. However, in the context of space communication, this approach is inherently flawed, and there is no rationale for treating satellite communication services on the same footing as IMT services.

The difference is further explained below:

Table -1: IMT vs. Satcom Services

S. No.	Basis	IMT Services	SATCOM Services
1.	**Network Architecture**	At ground (base stations)	In space (satellites) and ground (e.g., Gateway, PoP)
2.	**Spectrum Requirements**	Can work with different spectrum bands in different areas – An operator may have spectrum assigned in different bands in different LSAs, but that does not affect its services	Requires the same spectrum band the world over – If the same band is not assigned in India, the satellite system would not be able to serve its customers in India and hitherto unconnected areas would continue to remain unserved
3.	**Spectrum Re-Use**	If the same spectrum is assigned to multiple operators on a shared basis, it would necessarily result in interference to the extent that no	The same spectrum can be used by multiple operators without any harmful interference, since ITU prescribes a coordination mechanism for interference

		operator would be able to provide services	mitigation which has to be mandatorily followed by all satellite systems. This ensures efficient use of spectrum
4.	**Fragmentation of Spectrum**	Terrestrial operators can provide seamless services even if spectrum is fragmented in portions	The satellite will not be able to provide seamless services if the spectrum is fragmented and will lead to black spots in coverage
5.	**Change in Network Architecture**	Flexibility to change/update network architecture in case a different spectrum spot is assigned than the one currently being used	Since the same spectrum is to be used globally, there is no flexibility to change/update the network architecture in case a different spectrum spot is assigned than the one currently being used
6.	**Coverage**	Not able to cover difficult terrains and hilly/remote areas	Universal coverage –complements IMT coverage and not as a substitute
7.	**Target Customer Base**	Captive customer base already established – around 95% of the country's population covered	Limited use cases, e.g., limited population in uncovered/under-served areas, disaster management or maritime
8.	**Cross border interference**	Susceptible to cross border interference	Not susceptible to cross border interference

In view of the above, it is amply clear that space spectrum is inherently different from terrestrial spectrum, and satellite communication is on a completely different footing to IMT services.

Space-based communication systems are designed to reuse the same spectrum multiple times, enabling them to service numerous countries simultaneously. This distinction is crucial for ensuring that satellite systems can efficiently and effectively serve a wide range of users without unnecessary constraints or limitations.

Satellite spectrum is shared among various operators within the Fixed Satellite Service (FSS) and Broadcasting Satellite Service (BSS) sectors, and through the deployment of satellites in both geostationary (GEO) and non-geostationary (non-GSO) orbits. This shared usage model necessitates close collaboration and coordination among stakeholders to prevent interference and optimise spectrum utilisation. These operators also coordinate with one another to share the same frequencies across their services.

The coordination of satellite spectrum usage takes place at a global level, adhering to strict ITU Radio Regulations. The ITU plays an essential role in promoting the efficient use of satellite spectrum, facilitating the implementation of various coordination and interference mitigation techniques that help maintain a harmonious and well-regulated satellite communications environment.

Thus, the approaches and assumptions used in the case of terrestrial spectrum cannot be used in the case of satellite spectrum. Further, it is well acknowledged that two unequals should be treated differently. Therefore, applying same yardstick for satellite and terrestrial access spectrum, i.e., two unequals, is irrational and unfair.

It is thus Airtel's submission that satellite spectrum must not be assigned on an exclusive basis. After all, satellite spectrum is subject to the ITU Radio Regulation (ITU RR), and the procedure stipulated under these

regulations. The ITU-R and national regulatory agencies aim to promote the efficient use of satellite spectrum by allowing multiple users to share the same frequency bands via various coordination and interference mitigation techniques.

Thus, exclusive assignment of spectrum at the national level would defeat the purpose of ITU RR.

In addition, there are various other challenges that would arise both because of spectrum being exclusively assigned and also with reference to the actual auction itself. Both sets of challenges are elaborated below:

(A) <u>Satellite spectrum is a shared resource, granting exclusivity will fragment it to the detriment of its utility, making it inefficient.</u>

- Multiple satellite operators/service providers such as Fixed Satellite Service (FSS) and Broadcasting Satellite Service (BSS) operators share the same spectrum for provisioning of their respective services.

- In effect, the same spectrum is shared across many services like satellite-broadband, Direct-to-Home television, VSAT-CUG and governmental use including Defence networks, mission critical applications, maritime, etc.

- Space-based communications utilising NGSO systems reuse the same spectrum repeatedly to service multiple countries from the same satellites effectively. Sharing of spectrum for satellite services is made possible by the directivity that is provided by antennas deployed in the ground as well on the satellite. In addition, technical aspects such as polarisation, different modulations and coding schemes aid in spectrum sharing mechanisms. **Therefore, grant of exclusive rights in such a scenario would affect a wide range of services.**

- Spatial and band fragmentation is easily possible in cases of terrestrial spectrum (IMT) for the purpose of bringing in exclusivity, and it is also required to provide interference-free services. In case the same spectrum is assigned to multiple IMT operators, no operator would be able to provide services.

- On the other hand, the fragmentation of space spectrum unequivocally results in a loss of satellite capacity that cannot be compensated for. In fact, the sharing of frequencies between satellite operators is what results in large capacities being available over a given geography.

- **This means that the spectrum used for satellite services lacks exclusivity. Any attempt to create exclusivity by dividing it will render it virtually unusable for operators** leading to significant loss of value for satellite operators as well as of public interest.

- If spectrum were to be assigned exclusively, no single satellite player would be able to use the assigned block efficiently due to its highly inefficient frequency re-use capability (only a few satellites can operate simultaneously over a specific geography with limited bandwidth v/s millions of base stations). A large fraction of the capacity of airwaves will lie unused since spectrum will not be reused by multiple operators, leading to a low aggregate capacity over the country and, consequently, decrease its overall value. This would defeat the core principles of spectrum policy and management.

- There are other resources such as orbital resources and satellite constellations, that are required

for providing space-based services, and usage of these other resources in turn depends on the assignment of spectrum. This needs to be taken into account when deciding on the mode of spectrum assignment.

To draw an analogy, if orbital resources and spectrum in the satellite communications domain were to be compared to a community where plots of land exist and roads interconnect the plots, the plots of land could be equated to the orbital resources and the roads to the spectrum for the sake of this analogy. The roads are shared by the owners of the land so that they are able to access their plots. If the roads were to be assigned exclusively to specific plot owners, such a move would deprive other plot owners of access to their plots, making its full operation impossible. In other words, satellite spectrum resources thrive without exclusivity.

- It is important to note here that fragmentation of spectrum through auction, i.e., an exclusive assignment, may render the existing satellite architecture redundant and take away its flexibility to operate.

- The only way the above challenges arising because of exclusive assignment can be overcome to some extent is by prescribing mandatory sharing. However, **prescribing mandatory sharing itself goes against the principle of exclusivity.** As already explained, this will lead to the creation of an unnecessary intermediaries between the resource allocator and the resource user. With such conflicting incentives/disincentives, the bidding behavior of applicants may not be grounded in market reality. Rather, it would be much more efficient to assign spectrum on a non-exclusive basis.

(B) **<u>Auctioning the Satellite spectrum poses many risks to the detriment of various stakeholders including start-ups, competition, and will constrain Satellite capacity</u>**

1. Incompatible with non-exclusive assignment:

- The idea of auctions is intrinsically linked with exclusivity rights, as visible across sectors, where a resource is auctioned, e.g., coal mining rights, oil rigs. An auction mechanism will fail if exclusivity is not granted.
- The basic prerequisite of a resource that is to be auctioned is that it should be available for sale as a discrete, unique product. As established above, satellite spectrum does not satisfy this elementary criterion.
- Moreover, any commodity to be auctioned must be free from encumbrances. Satellite spectrum has international encumbrances. Hence, auctions are incompatible with non-exclusivity.

2. Will not be able to ensure the spectrum requirement of satcom

- An IMT service provider can operate with different spectrum bands in different regions. In India itself, terrestrial spectrum auctions are held LSA-wise, which means that the same operator is assigned different spectrum bands in different LSAs. The difference in bands does not have any adverse impact on the service to customers of any of these LSAs.
- However, this is not the case with space-based communication services. **A satellite operator necessarily requires the same spectrum the world over.**
- Satellite systems have a predefined range of frequencies filed at ITU, which follow long and rigorous processes of notification and registration into Master International Frequency Register (MIFR). These frequencies cannot be subsequently picked and chosen depending on the outcome of the spectrum assignment at national level.

- **If the spectrum to which its satellites are tuned is not assigned to the satellite service provider in a particular country, it will not be able to serve customers in that country.**
- **An auction would never be able to ensure that the spectrum required by each operator is necessarily assigned to it – affecting the incumbent operators providing services at the time of every new auction cycle.**
- A satellite operator requires access to four frequencies, i.e., uplink and downlink each of them for the Satellite Earth Station Gateway (SESG) and the User Terminals (UT), respectively. The design will have to ensure availability of this entire combination lest it render the use case for Satcom meaningless if players fail to obtain adequate spectrum in all required links for service provisioning. A coordinated result of this nature is unlikely to be achieved through an auction process.
- Moreover, every operator would have different requirements as to the quantum of spectrum in each of these four frequencies, depending on the kinds of services being offered by it. Thus, even bundling of the four kinds of frequencies for auction would not be possible since any bundling would be uniform and not as per the different requirements of different operators.

3. Satellite industry too nascent to afford auctions and risks creating gatekeepers:

- The IMT industry has been operating for decades, and already has an established customer base comprising over 95% of the population.
- This leaves a very limited target market for the satellite industry mostly consisting of the parts of the Indian population still excluded from connectivity. Consequently, its revenue potential is also unproven, restricted and likely to be poor.
- Satellite spectrum auctions could create gatekeepers with chunks of spectrum and possibly blocking the entry of smaller and new players thereby constraining the competitive environment.

4. **Uncertainty of investments and business case**

- In case of auctions, any enterprise with the plan to establish a constellation of satellites for providing broadband services in India, would be uncertain about its investments, since it would not be able to get an assurance about the spectrum it could acquire and whether it would be what was required by its satellites.
- Such uncertainty could mean that this fledgling space sector which is in its infancy could get stifled before realising even a fraction of its potential because of the complications arising from the introduction of spectrum auctions.

5. No international precedents

- The world over, administrative allocation is the preferred method for satellite spectrum. Auctions have been attempted in a handful of countries but unsuccessfully. Even in cases where there have been auctions, they have been of orbital slots.

  The Authority, too, has recognised and acknowledged this in Para 3.122 and 3.123 of the CP. The Authority should closely examine why no other country – including the ones conducting terrestrial spectrum auctions since way before India – has gone down this path before.

In light of the facts above, it is apparent that auctioning satellite spectrum will not only be against international best practices but will also cause technological - economic challenges for the satellite sector in the country.

The government should push for the continued enhancement of communication services in this regard and provide the right impetus to the domestic satellite industry by assigning spectrum on a shared administrative basis rather than stifling this promising growth through auctions.

Therefore, satellite spectrum must be assigned on a non-exclusive/shared and administrative basis, and auctioning is neither efficient nor desirable.

Q5. In case it is decided to assign spectrum in higher frequency bands such as C band, Ku band and Ka band for space-based communication services to licensees on an exclusive basis,

a. What should be the block size, minimum number of blocks for bidding and spectrum cap per bidder? Response may be provided separately for each spectrum band.

b. Whether intra-band sharing of frequency spectrum with other satellite communication service providers holding spectrum up to the prescribed spectrum cap, needs to be mandated?

c. Whether a framework for mandatory spectrum sharing needs to be prescribed? If yes, kindly suggest a broad framework and the elements to be included in the guidelines.

Any other suggestions to ensure that that the satellite communication ecosystem is not adversely impacted due to exclusive spectrum assignment, may kindly be made with detailed justification.

Airtel Response:

Please refer to the Preamble and the detailed response to Q4. To reiterate, spectrum in higher frequency bands such as C band, Ku band and Ka band, required for space-based communication services, should not be assigned to licensees on an exclusive basis.

The principles governing satellite spectrum management differ significantly from those applied to terrestrial mobile access spectrum. As explained in the previous answer, satellite spectrum, specifically within the Fixed Satellite Service (FSS) domain, cannot be allocated on an exclusive basis, and therefore an auction model cannot be considered.

The questions (b) and (c) seemingly stem from an understanding that satellite spectrum should be treated in a manner similar to terrestrial. However, concepts such as block size, spectrum cap, intra-band share, which originate from terrestrial mobile spectrum management, are not applicable to satellite spectrum.

P**utting a cap – which is only logical if it is auctioned and exclusively assigned – fragments the utility of shared satellite spectrum**. Airtel is concerned that auctioning the satellite spectrum and creating an exclusiveness will create barriers for competition, for example competitors may block access to it by bidding and winning partial or full spectrum inspite of having no such global allocation, make satellite systems redundant and severely hamper the emerging space ecosystem in the country.

Moreover, as per Webster's Dictionary, the word "exclusive" is synonymous with "the power to exclude". **Hence, if something is assigned and declared exclusive, the assignee should have the power to decide whether to use the resource by itself or share it with someone on its own terms and conditions.**

Making an already sharable scarce spectrum an exclusive unit, then auctioning it and subsequently making it sharable through a regulatory mandate seems to be an exercise in futility, especially as it renders an efficient process complex and difficult.

In fact, it has been duly recognized by the Authority itself in the consultation paper that the satellite communication ecosystem would be adversely impacted by exclusive spectrum assignment. Therefore, in Airtel's view, **spectrum for satellite should continue to be assigned on a shared administrative basis to avoid such complexities.**

Moreover, are there any actual challenges that will be overcome by auctioning satellite spectrum? If so, what are they?

- Would it result in bringing a new entrant to the market? No, because that is not a challenge under an already shared spectrum regime.
- Would it result in connecting the unconnected who are primarily unserved due to techno-economic challenges? No, because that is the precise challenge administratively assigned spectrum would solve.
- Is it about finding a price for spectrum as resource? Hardly; since auctioning is not the adequate option for a non-exclusive resource. Instead there can be global benchmarks for similar services and criteria that can be considered to charge a recovery price.
- Is it about ensuring transparency in the process of spectrum assignment wherein the deserving and serious entities only come and operate? But this could easily be solved by prescribing simple yet effective qualifying eligibility criteria as elaborated below:
    - ✓ Contiguous harmonised spectrum in sufficient quantity be made available as per national frequency allocation plans. The system of advance publication, coordination and notification under the ITU Radio Regulations (RR) be followed.
    - ✓ Allocation be linked to the commercial launch of services within a defined period (within one year of spectrum assignment) in priority areas/ geographies.
    - ✓ Lastly, licenses required as per the country norms be put in place.

Therefore, Airtel reiterates that spectrum for space-based communications should not and must not be assigned on an exclusive basis. Rather, **it should be assigned on a non-exclusive basis, administrative basis.**

Q6. What provisions should be made applicable on any new entrant or any entity who could not acquire spectrum in the auction process/assignment cycle?

a. Whether such entity should take part in the next auction/ assignment cycle after expiry of the validity period of the assigned spectrum? If yes, what should be the validity period of the auctioned/assigned spectrum?

b. Whether spectrum acquired through auction be permitted to be shared with any entity which does not hold spectrum/ or has not been successful in auction in the said band? If yes, what measures should be taken to ensure rationale of spectrum auction and to avoid adverse impact on the dynamics of the spectrum auction?

c. In case an auction based on exclusive assignment is held in a spectrum band, whether the same spectrum may again be put to auction after certain number of years to any new entrant including the entities which could not acquire spectrum in the previous auction? If yes,

i. After how many years the same spectrum band should be put to auction for the potential bidders?

ii. What should be the validity of spectrum for the first conducted auction in a band? Whether the validity period for the subsequent auctions in that band should be co-terminus with the validity period of the first held auction?

Airtel Response:

Please refer to the Preamble and the detailed response to Q4 and Q5.

To reiterate, **satellite spectrum should be assigned administratively and on a non-exclusive basis only.** This would ensure that a situation in which an entity is not able to acquire spectrum in the assignment cycle would simply not arise.

Unlike terrestrial players who with various spectrum bands can decide to switch (on and off) their base stations easily, the FSS systems is designed to operate on a particular/same frequency range across the globe, serving multiple countries with the same frequency bands.

The terrestrial base stations support the complete frequency range for each of the IMT identified bands which makes it convenient to harmonise the frequency bands, allowing swapping and the deployment of new frequencies in no time at all with only a change in configuration software. It is due to this feasibility that terrestrial services have been able to undergo rigorous swapping / changing of frequencies 7 - 8 times in the past 10 years, thereby ensuring the continuity of spectrum and increasing spectral efficiency.

Such swapping/ harmonizing of spectrum is **not possible with satellite-based communication services, wherein once the frequencies are configured to serve the globe, the same frequencies would be required from each country for providing services via satellite constellations and ground stations. Auctioning of such a globally coordinated and harmonised approach will be impractical as no one will deploy separate satellite constellations for each country.**

This is the main reason for the **satellite spectrum allocation being coordinated at ITU level**. Additionally, auctioning would render the satellite constellation operator at the mercy of a service provider for spectrum sharing in a specific market. Imagine a situation where this kind of complexity arises at multiple jurisdictions/countries thereby making the entire basis of a global constellation redundant and leading to India missing out on a crucial transponder bandwidth capacity which could be used for the public good.

Hence, in the case of a shared/non-exclusive scenario, the licensor can choose to assign it as and when it receives an application for assignment in coordination with ITU. Following such an approach would ensure that the question of a new entrant having to wait for the validity period of the existing operator to exhaust before a sharable scarce frequency spectrum could be awarded to it would never arise. **This would also help enhance competition and consequently benefit consumers.**

Furthermore**, limited or only partial access to the required spectrum, by using various assignment cycles as done for terrestrial spectrum assignment, can severely hinder an operator's ability to provide service in that market. In such a scenario, consumers are adversely affected, as they lose out on the potential benefits that increased competition and greater choice among service providers could bring.**

The period of spectrum assignment should be co-terminus with the period of licenses of an entity. In other words, and importantly, satellite spectrum should be assigned on a shared, non-exclusive and non-auction basis only.

Auctioning satellite spectrum could be risky and pose more questions than answers. It could have an adverse impact on the entire satellite industry. In fact, there is the grave risk of new entrants and small players being excluded from participating in the satellite landscape and ecosystem altogether if spectrum is auctioned.

Again, as stated previously, **to mitigate these risks, the authority / licensors will have to forcefully create interventionist approaches like** mandatory spectrum sharing, spectrum caps, trading conditions, Reference Interconnect Offer (RIO), regulated interconnections, etc. These, in turn, will also be unfair for an auction winner.

At Airtel we are deeply concerned that the unintended negative consequences of auctioning the satellite spectrum might result in the creation of exclusive silos that are likely to outweigh the benefits that simple, shared assignments via an administrative route could offer. This may force the authority to prescribe ex-ante interventions which could simply be avoided using the present approach.

Ensuring fair and comprehensive access to satellite spectrum is essential for fostering a competitive and innovative satellite communications ecosystem.

Therefore, satellite spectrum should be assigned administratively and on a non-exclusive basis only.

Q7. Whether any entity which acquired the satellite spectrum through auction/assignment should be permitted to trade and/or lease their partial or entire satellite spectrum holding to other eligible service licensees, including the licensees which do not hold any spectrum in the concerned spectrum band? If yes, what measures should be taken to ensure rationale of spectrum auction and to avoid adverse impact on the dynamics of the spectrum auction?

Airtel Response:

Please refer to the Preamble and responses to Q4, Q5 and Q6.

To encapsulate, satellite spectrum should be assigned administratively and on a non-exclusive basis only. With administrative non-exclusive assignment, the entity will be able to approach the licensor directly and get the spectrum required without the complications attendant on permissions and the acquiring of permits through trading/leasing partial/full spectrum.

Q8. For the existing service licensees providing space-based communication services, whether there is a need to create enabling provisions for assignment of the currently held spectrum frequency range by them, such that if the service licensee is successful in acquiring required quantum of spectrum through auction/ assignment cycle in the relevant band, its services are not disrupted? If yes, what mechanism should be prescribed?

Airtel Response:

Please refer to the responses to Q6 and Q7.

Satellite spectrum should be assigned administratively and on a non-exclusive basis only. With non-exclusive assignment, the need for enabling provisions for currently held spectrum frequency ranges would no longer exist and with it the possibility of services getting disrupted in such scenarios would also vanish.

Spectrum should be assigned on basis of filings, co-ordination, and interference mitigation measures at the ITU level. Any assignment of spectrum will always require coordination at the ITU and local administration levels to understand the status of deployment of satellite constellation and ground infrastructure prior to taking any decisions on the assignment. The licensees should be required to furnish the details of ITU filings, agree on coordination and interference mitigation mechanisms as defined by the ITU along with the details of spectrum bands already held/required for providing space-based communication services.

Q9. In case you are of the opinion that the frequency spectrum in higher frequency bands such as C band, Ku band and Ka band for space- based communication services should be assigned on shared (non-exclusive) basis, -
a. Whether a broad framework for sharing of frequency spectrum among satellite communication service providers needs to be prescribed or it should be left to mutual coordination? In case you are of the opinion that broad framework should be prescribed, kindly suggest the framework and elements to be included in such a framework.
b. Any other suggestions may kindly be made with detailed justification.

Airtel Response:

Please refer to the Preamble and the responses to Q5, Q6 and Q7. Frequency spectrum for space-based communication in higher frequency bands such as C band, Ku band and Ka band should be assigned on a shared (non-exclusive) basis.

For fixed satellite service spectrum, a shared basis is the only viable approach. It is the only way this resource will be efficiently utilised. Sharing allows multiple satellite operators to access and coordinate spectrum usage, ensuring optimal use of available frequencies.

Further, because **there is already a global-level coordination framework put in place by the ITU for the purposes of preventing harmful interference and encouraging coordination and because it has been working efficiently thus far, there is no need to prescribe another broad framework** for the sharing of frequency spectrum among satellite communication service providers.

By adhering to the current ITU framework and coordination procedures, 99.95% of spectrum assigned to satellite networks has been free from reported harmful interference. This impressive statistic demonstrates the robustness of the existing framework. The principle that the right to use orbital and spectrum resources for a satellite network or system is acquired through negotiations concerned with the actual usage has proven to be the most effective means of achieving rational, cost-effective, and efficient spectrum and orbital management.

Therefore, **sharing of satellite spectrum should continue to be left to mutual coordination as per the ITU framework.**

Q10. In the frequency range 27.5-28.5 GHz, whether the spectrum assignee should be permitted to utilize the frequency spectrum for IMT services as well as space-based communication services, in a flexible manner? Do you foresee any challenges arising out of such flexible use? If yes, in what manner can the challenges be overcome? Kindly elaborate the challenges and the ways to overcome them.

AND

Q11. In case it is decided to permit flexible use in the frequency range of 27.5 - 28.5 GHz for space-based communication services and IMT services, what should be the associated terms and conditions including eligibility conditions for such assignment of spectrum?

Airtel Response:

In the frequency range 27.5-28.5 GHz, **the spectrum assignee** should not be permitted to utilize the frequency spectrum in a flexible manner for IMT services and space-based communication services.

The 28GHz band starting from 27.5GHz is being utilised by satellites for broadband and mission critical government services. If this satellite spectrum is further reduced, it would impact the serving capacity and offered quality of services in the uncovered regions which are hard to serve from the terrestrial networks.

The IMT auction, held in the Year 2022, witnessed that approximately 17,350 MHz of spectrum went unsold in the 26 GHz band, i.e., 28% of the spectrum is still lying vacant and idle. Further, India has witnessed a 5G rollout which has been quick, smooth and among the fastest in the world. Within a short timeframe, as of April 2023, 1.5 lakh 5G base stations have been deployed throughout the country but without the launch of any single site in mmwave bands. This clearly indicates that demand and requirements for mmwave spectrum bands for IMT services are not too much and further spectrum may not be required.

International Learnings:

- Evidence from **the international scenario indicates that the demand for more mmwave spectrum remains uncertain for IMT.** Recently, the South Korean MNOs, with 800 MHz of spectrum each in mmwave bands, have struggled to justify investing in mmwave spectrum for 5G due to the lack of an ecosystem, demand and applications. **Even five years post auction, the South Korean MNOs have deployed only 161 base stations in the mmwave** as against a build-out requirement of 45,000 base stations as part of rollout obligations.

- As a result, **the South Korean government has announced the decision to withdraw 28 GHz, which was awarded to 5G licensees,** due to (i) lack of investments and interest (ii) non-optimal utilisation of 28 Ghz band by IMT/5G licensees. There is currently no valid evidence to suggest that actual usage of the 26 GHz band for IMT services will not be sufficient to meet such public interest needs as there are and that additional bands in 28GHz would be required for IMT services.

- **The 28GHz band (Ka-Band) has long been assigned for satellite service. If terrestrial mobile services are authorised in this band there could be the risk of interference.**

  This band was not among those accepted as a potential IMT band at ITU WRC-15 and WRC-19. The ITU Member States instead harmonised a total of 17 GHz of other mmwave bands for 5G. Even countries

who went against the ITU rules are now making reversals. The FCC Chairwoman has stated said that the FCC made a mistake a few years ago when it focused all its energy in the early 5G days on mmwave[2]. Recently, Verizon was also reported to be selling off some of its 28GHz in the secondary market[3].

In view of this, the spectrum band from 27.5 to 30GHz should remain exclusive for satellite use.

Q12. Whether there is a requirement for permitting flexible use between CNPN and space-based communication services in the frequency range 28.5-29.5 GHz?

AND

Q13. Do you foresee any challenges in case the spectrum assignee is permitted to utilize the frequency spectrum in the range 28.5-29.5 GHz for cellular based CNPN as well as space-based communication services, in a flexible manner? What could be the measures to mitigate such challenges? Suggestions may kindly be made with justification.

Airtel Response:

No, there is no requirement for permitting flexible use between captive non-public network (CNPN) and space-based communication services in the frequency range 28.5-29.5 GHz.

The guidelines on CNPN released by DoT on 27 June 2022 have envisaged 4 options for the setting up of CNPN in India. They are listed below:

a. **TSPs (**Access Service Licensees) **can provide private networks as a service to an enterprise** by using network resources (such as through network slicing) over their PLMN public network.

b. TSPs (Access Service Licensees) can establish isolated CNPN for the enterprises using IMT spectrum acquired by them.

c. **Enterprises may obtain spectrum on lease from TSPs** & establish their own isolated network.

d. **Enterprises may obtain spectrum directly from DoT** and establish their own isolated network.

Out of the above options envisaged, it is clearly understood that CNPN can be established by TSP only via options a,b and c and that the fourth option is not required if you take into consideration the terrestrial nature of CNPN deployment.

Further, private networks using 5G technology do so to access the economies of scale of the IMT ecosystem and to make the best use of lower cost equipment to implement a private network. Implementing such networks outside of globally harmonised IMT spectrum bands will defeat the purpose. If at all necessary, it may be better to find an alternative IMT band instead for CNPN instead of 28.5-29.5 GHz.

Q14. Whether space-based communication services should be categorized into different classes of services requiring different treatment for spectrum assignment? If yes, what should be the classification

[2] https://www.axios.com/fcc-5g-midband-milimeter-spectrum-digital-divide-ee591e73-53be-4cf9-8818-f43bdb8d1976.html
[3] https://www.rcrwireless.com/20210326/5g/verizon-sells-5g-mmwave-spectrum-to-geolinks

of services and which type of services should fall under each class of service? Kindly justify your response. Please provide the following details:

a. Service provider-wise details regarding financial and market parameters such as total revenue, total subscriber base, total capital expenditure etc. for each type of service (as mentioned in the Table 1.3 of this consultation paper) for the financial year 2018-19, 2019-20, 2020-21, 2021-22, and 2022-23 in the format given below:

Type of service:				
Financial Year	Revenue (Rs. lakh)	Subscriber base	CAPEX for the year (Rs. lakh)	Depreciation for the year (Rs. lakh)
2018-19				
2019-20				
2020-21				
2021-22				
2022-23				

b. Projections on revenue, subscriber base and capital expenditure for each type of service (as mentioned in the Table 1.3 of this consultation paper) for the whole industry for the next five years starting from financial year 2023-24, in the format given below:

Type of service:			
Financial Year	Revenue (Rs. lakh)	Subscriber base	CAPEX for the year (Rs. lakh)
2023-24			
2024-25			
2025-26			
2026-27			
2027-28			

Airtel Response:

Firstly, In its consultation paper (para no. 3.76 to 3.78), TRAI has referred the Hon'ble Supreme Court Judgment in the context of 2G.

However, **the Hon'ble Supreme Court Order was in the context of arbitrary grant of terrestrial spectrum for exclusive usage. In contrast, space-based communication is non-exclusive by its very nature and hence the SC order cannot be extrapolated to the satellite spectrum.**

A crucial agenda under the National Digital Communications Policy 2018 (Policy) is to Connect India by creating a robust digital communication infrastructure. To accomplish this, the Space Policy envisages strengthening satellite communication technologies in India. Satellite-based communication systems can provide coverage to remote and most inaccessible areas in a geographically widespread country like India. **Thus, it is evident that the Policy aims at developmental needs to subserve the common good by ensuring that the satellite-based communication service is made available widely.**

2G JUDGMENT[4] – RATIO OF DECISION BINDING ONLY QUA PARTIES TO THE LITIGATION:

The 2G case was specific to certain illegal allocations of spectrum, which were examined by the Hon'ble Supreme Court and were set aside vide the Judgment. However, the 2G Judgment neither extends to allocation of all natural resources in general nor prohibits administrative allocation of natural resources.

In a presidential reference (Reference)[5], the Hon'ble Supreme Court, inter-alia held that common good is the sole guiding principle under Article 39(b) of the Constitution of India for the distribution of natural resources. Following is the extract of relevant findings of the Supreme Court while answering the Reference:

"Our reading of these paragraphs suggests that the Court was not considering the case of auction in general, but specifically evaluating the validity of those methods adopted in the distribution of spectrum from September 2007 to March 2008. … This suggests that the recommendation of auction for alienation of natural resources was never intended to be taken as an absolute or blanket statement applicable across all natural resources, but simply a conclusion made at first blush over the attractiveness of a method like auction in disposal of natural resources.

…
Further, the final conclusions summarized in paragraph 102 of the judgment (SCC) make no mention about auction being the only permissible and intra vires method for disposal of natural resources; the findings are limited to the case of spectrum. In case the Court had actually enunciated, as a proposition of law, that auction is the only permissible method or mode for alienation/allotment of natural resources, the same would have found a mention in the summary at the end of the judgment."

…

We find that the 2G Case does not even consider a plethora of laws and judgments that prescribe methods, other than auction, for dispensation of natural resources; something that it would have done, in case, it intended to make an assertion as wide as applying auction to all natural resources. Therefore, we are convinced that the observations in Paras 94 to 96 could not apply beyond the specific case of spectrum, which according to the law declared in the 2G Case, is to be alienated only by auction and no other method."

If the Government policy subserves the common good, irrespective of the means adopted, it is clearly in accordance with the principle enshrined in Article 39(b). Where revenue maximization is not the object of a policy of distribution, the question of auction would not arise. Revenue considerations may assume secondary consideration to developmental considerations. Revenue maximization may not always be the best way to subserve the public good.

The Hon'ble Supreme Court further observed the submission that the mandate of Article 14 requires that *disposal of a natural resource for commercial use must be for revenue maximization and thus by auction* -- is neither based on law nor on logic. Even the mandate of 39(b) imposes no restrictions on the means adopted to subserve the public good and uses the broad term 'distribution', suggesting that the methodology of distribution is not fixed. Economic logic establishes alienation/allocation of natural resources to the highest bidder may not necessarily be the only way to subserve the common good and, at times, may run counter to the public good. Hence, it needs little emphasis that the disposal of all natural

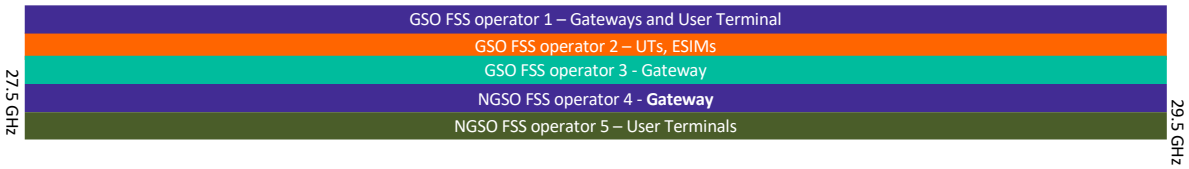
[4] Presidential reference seeking clarification whether the only permissible method for disposal of all natural resources across all sectors and in all circumstances is through auction - Judgment dated 02.02.2012 in Writ Petition (Civil) No.423 of 2010.
[5] Re: Special Reference No. 1 of 2012" dated 27.09.2012.

resources through auctions is clearly not a constitutional mandate. **There is no directive under the 2G judgement that natural resources can only be allocated through auctions.**

Therefore, in light of the aforesaid discussions, judicial decisions and considering the core objective of the Policy and to promote availability of satellite-based communication service to the country's remotest and most inaccessible areas for common good, it is just and necessary that the spectrum for satellite-based communication service be assigned administratively to the eligible licensees to provide much needed impetus to players to develop this capital-intensive sector in order to remain at par, globally.

Further, there is no need for space-based communication services to be categorised into different classes of services requiring different treatment for spectrum assignment since multiple services share (and are already being provided to use) the same frequency bands, which are currently being assigned on an administrative basis.

For example, **the same band can be used for different services, as illustrated below:**



Thus, **there is no need to bring in additional complexity by categorising space-based communication services into different service classes requiring different treatments for spectrum assignment.**

Q15. What should be the methodology for assignment of spectrum for user links for space-based communication services in L-band and S-band, such as-
a. Auction-based
b. Administrative
c. Any other?

Airtel Response:

Please refer to our responses in earlier questions as well as the Preamble.

The methodology for assignment of spectrum for user links for space-based communication services in L-band and S-band should be administrative only.

An auction-based spectrum allocation may discourage new startups and smaller players from entering the market due to high initial costs. Administrative allocation would foster innovation by encouraging a diverse range of players, including startups, to access spectrum at lower costs and ensuring a level playing field for all participants, regardless of their financial capabilities. Fostering a competitive environment with lower barriers to entry will promote the growth of the space-based communication sector, supporting the expansion of the Indian startup ecosystem.

Q16. What should be the methodology for assignment of spectrum for user links for space-based communication services in higher spectrum bands like C-band, Ku-band and Ka-band, such as
a. Auction-based

b. Administrative
c. Any other?
Please provide your response in respect of different types of services (as mentioned in Table 1.3 of this consultation paper).

Airtel Response:

Please refer to our responses in earlier questions as well as the Preamble.

The methodology for assignment of spectrum for user links for space-based communication services in higher spectrum bands, like C-band, Ku-band and Ka-band, should be administrative only.

The reason for assigning spectrum administratively is that satellite spectrum is a shared resource wherein the same spectrum can be used by multiple users. Any other approach, e.g., auctioning satellite spectrum, will distort its utility since a satellite constellation (e.g., a typical LEO system) cannot operate with different spectrum in different parts of the world. In an auction-based scenario, competitive forces can block spectrum capacity/hoard it. This will lead to non-utilisation in areas where another operator (who has globally been assigned the same spectrum) could have used it. This will severely constrain the available capacity for satellite services.

An auction-based allocation may discourage new startups and smaller players from entering the market due to high initial costs.

Administrative allocation would foster innovation by encouraging a diverse range of players, including startups, to access spectrum at lower cost and ensuring a level playing field for all participants, regardless of their financial capabilities. Fostering a competitive environment with lower entry barriers will promote the growth of the space-based communication sector, including Indian startup ecosystem.

Globally too, satellite spectrum has been assigned based on an administrative approach.

Therefore, assignment of spectrum for user links for space-based communication services in higher spectrum bands, like C-band, Ku-band and Ka-band, should be made only on an **administrative** basis.

Q17. Whether spectrum for user links should be assigned at the national level, or `telecom circle/ metro-wise?

Airtel Response:

Spectrum for user links should be assigned only at the national level since satellite constellations are created for global and wider coverage. This is also consistent with the technical aspects of space-based communications since the spot beams might cover the entire country (unlike terrestrial communication services).

The concept of telecom circle/metro is not relevant from the perspective of space-based communication services. In fact, even today all satellite-based services, i.e., VSAT, DTH, are being provided at the national level only.

Q18. In case it is decided to auction user link frequency spectrum for different types of services, should separate auctions be conducted for each type of services? Kindly justify your response with detailed methodology.

Airtel Response:

Please refer to the Preamble and responses to all the previous questions.

User link frequency spectrum for all types of space-based services should be assigned administratively on a non-exclusive basis only.

Auctioning the spectrum for space-based communications services will be much more complex and will have to necessarily be associated with multiple licensing cum regulatory interventions. As already explained, the medicine (auction) may turn out to be riskier than the symptoms it intends to cure.

Therefore, the satellite spectrum for user links as well should continue to be assigned on an administrative basis for the provisioning of different types of services. This will obviate the needless complications that are likely to arise out of spectrum auctions.

Q19. What should be the methodology for assignment of spectrum for gateway links for space-based communication services, such as
a. Auction-based
b. Administrative
c. Any other?
Please provide your response in respect of different types of services. Please support your response with detailed justification.

Airtel response:

The methodology for assigning spectrum for gateway links for space-based communication services should be administrative only.

Gateway operations are critical to maintaining the reliability and resilience of satellite networks. By assigning gateway spectrum administratively, regulators can ensure that satellite operators have the necessary resources to establish robust and reliable communications links between satellites and terrestrial networks, ultimately contributing to the overall stability of the satellite communications ecosystem.

Most importantly, Gateway frequencies are used at specific locations only, which makes them much more suitable for sharing among different satellite operators than user link spectrum. This localised usage of frequencies allows for greater coordination and sharing of spectrum resources, promoting more efficient utilisation of the available frequencies. **By allocating gateway spectrum administratively, regulators can facilitate the sharing of these resources, ensuring that operators are able to establish and maintain their gateway infrastructure at the designated locations. This approach maximises the efficient use of spectrum.**

Furthermore, auction processes for gateway spectrum may create contradictions within the existing regulatory requirements in India. Failure to obtain the necessary gateway spectrum through an auction might result in satellite operators being unable to meet their regulatory obligations, leading to an artificial

barrier to compliance. Further, mandatory sharing by one competitor with another competitor will never work practically.

Hence, **spectrum for gateway should be assigned on an administrative and non-exclusive basis**.

Q20. In case it is decided to auction gateway link frequency spectrum for different types of services, should separate auctions be conducted for each type of services? Kindly justify your response with detailed methodology.

Airtel response:

Please refer to the detailed responses to Q4, Q5, Q6, Q7 and Q 19, respectively.

Spectrum for gateway links should continue to be assigned on an administrative and non-exclusive basis, irrespective of the type of services required.

A satellite operator requires access to four frequencies, i.e., to uplink and downlink each of them for the Satellite Earth Station Gateway (SESG) and the User Terminals (UT), respectively. **The design will have to ensure availability of this entire combination lest it render the use case for Satcom meaningless if players fail to obtain adequate spectrum in all required links for service provisioning.** A coordinated result of this nature is unlikely to be achieved through an auction process.

Moreover, every operator would have different requirements as to the quantum of spectrum in each of these four frequencies, depending on the kinds of services being offered by it. Thus, even **bundling the four kinds of frequencies for auction would not be possible since any bundling would be uniform and not as per the different requirements of different operators.**

Hence, **spectrum for gateway should not be assigned through auction**.

Q21. In case it is decided to assign frequency spectrum for space-based communication through auction,
a. What should be the validity period of the auctioned spectrum?
b. What should be the periodicity of the auction for any unsold/ available spectrum?
c. Whether some mechanism needs to be put in place to permit the service licensee to shift to another satellite system and to change the frequency spectrum within a frequency band (such as Ka- band, Ku-band, etc.) or across frequency bands for the remaining validity period of the spectrum held by it? If yes, what process should be adopted and whether some fee should be charged for this purpose?

Airtel Response:

Please refer to the Preamble and detailed responses to previous questions. Frequency spectrum for space-based communications services should not be auctioned. It should continue to be allocated on an administrative and non-exclusive basis.

Further, **as regards the validity period of spectrum, the validity should continue to be co-terminus with the license period of the licensee.**

Q22. Considering that (a) space-based communication services require spectrum in both user link as well as gateway link, (b) use of frequency spectrum for different types of links may be different for different satellite systems, and (c) requirement of frequency spectrum may also vary depending on the services being envisaged to be provided, which of the following would be appropriate:

i. to assign spectrum for gateway links and user links separately to give flexibility to the stakeholders? In case your response is in the affirmative, what mechanism should be adopted such that the successful bidder gets spectrum for user links as well as gateway links.

Or

ii. to assign spectrum for gateway links and user links in a bundled manner, such that the successful bidder gets spectrum for user link as well as gateway link? In case your response is in the affirmative, kindly suggest appropriate assignment methodology, including auction so that the successful bidder gets spectrum for user links as well as gateway links.

Airtel response:

Please refer to the detailed responses to Q4, Q16, Q19 & Q20.

Considering that (a) space-based communication services require spectrum for both user links as well as gateway links, (b) use of frequency spectrum for different types of links may be different based on satellite systems, and (c) requirement of frequency spectrum may vary depending on the services being envisaged to be provided, **it would be appropriate to assign spectrum for gateway links and user links in a bundled manner, such that the successful assignee gets spectrum for both the user as well as gateway link.**

Additionally, it should be assigned on an administrative basis to ensure that the existing operations are not jeopardised and, also, that a new entrant does not face severe difficulties in setting up its operations.

Q23. Whether any protection distance would be required around the satellite earth station gateway to avoid interference from other satellite earth station gateways for GSO/ NGSO satellites using the same frequency band? If yes, what would be the protection distance (radius) for the protection zone for GSO/ NGSO satellites?

Airtel Response:

The distance required around the satellite earth station gateway, to avoid interference from other satellite earth station gateways for GSO/ NGSO satellites using the same frequency band, would **depend on the technical characteristics of the Gateway as well as the terrain.**

Any presence of IMT or other services including satellite user terminals, fixed or mobile, within vicinity of the gateway locations could create potential interference.

It is therefore advisable that instead of a coordination threshold distance, a power flux-density (PFD) threshold or another technical threshold for such coordination be adopted.

Q24. What should be the eligibility conditions for assignment of spectrum for each type of space-based communication service (as mentioned in the Table 1.3 of this Consultation Paper)? Among other things, please provide your inputs with respect to the following eligibility conditions:

a. Minimum Net Worth
b. Requirement of existing agreement with satellite operator(s)
c. Requirement of holding license/ authorization under Unified License prior to taking part in the auction process.

Airtel Response:

There should be strict eligibility conditions for assignment of spectrum for each type of space-based communication service.

The applicant eligibility criteria exist to guard against speculative and spurious filings by ensuring applicants have the ability (financial and technical in general) to launch and operate a satellite. While the criteria are usually rigorous, the application guidelines are not always rigid. Technical requirements and conditions of operation for satellites are largely set by the ITU following ITU RR and filings.

The eligibility conditions for the assignment of spectrum for NGSO-based communication services should be as follows:

1. **The service provider should hold a valid license from the DoT & Authorization from IN-SPACe for providing satellite-based services in the specified bands.**
2. The service provider should have a valid ITU filing of its deployed satellite network.
3. In principle approval for Satellite Earth Station Gateway needs to be obtained from DoT.
4. Service obligations should be met. These could include, for example, getting a satellite constellation up and running with the mandate of national coverage parameters within a year from the date of spectrum assignment, first responder use and government access.
5. The service provider who can show its presence via service launch in at least one country directly through its constellations should be accorded priority for launch of service across the country for the public good.

Q25. What should be the terms and conditions for assignment of frequency spectrum for both user links as well as gateway links for each type of space-based communication service? Among other things, please provide your detailed inputs with respect to roll-out obligations on space-based communication service providers. Kindly provide response for both scenarios viz. exclusive assignment and non- exclusive (shared) assignment with justification.

Airtel Response:

The assignment of frequency spectrum for both user links as well as gateway links for each type of space-based communication service should be on an administrative and non-exclusive basis.

However, **we recognize that any spectrum being assigned on administrative basis should have roll out obligations as well to ensure that only serious and long-term players seek the assignment of spectrum instead of entry of non-serious players for the purpose of hoarding the spectrum.**

Therefore, for the rollout of services, **there should be a condition that the satellite service provider start commercial service in the country with pan-India coverage with relevant use cases (such as maritime, Defence, etc) through its satellite constellation within a year of the assignment of spectrum,** failing which its spectrum should automatically revert to the Wireless Planning & Coordination (WPC) Wing. This will

ensure that only those genuine operators who have been globally assigned the spectrum and have invested for the establishment of Gateway are seeking the assignment of spectrum for the launch of their services.

Q26. Whether the provisions contained in the Chapter-VII (Spectrum Allotment and Use) of Unified License relating to restriction on crossholding of equity should also be made applicable for satellite- based service licensees? If yes, whether these provisions should be made applicable for each type of service separately? Kindly justify your response.

Airtel Response:

The provisions contained in the Chapter-VII (Spectrum Allotment and Use) of Unified License relating to restriction on crossholding of equity should not be made applicable for satellite- based service licensees.

The restriction on crossholding of equity was introduced to discourage monopoly or the hoarding of spectrum for mobile services (**which is exclusively assigned LSA wise**) in order to ensure adequate competition in the market. *On the contrary, for the provision of satellite-based services, this is not a concern since there is no exclusive spectrum assignment and several satellite operators share the entire spectrum range non-exclusively.*

Cross-holding restrictions should be kept separate for access spectrum in terrestrial networks and access spectrum in cases of satellite communication. This means, an operator holding access spectrum for terrestrial networks should not be allowed to hold any beneficial interests in another operator holding access spectrum for terrestrial networks. However, there should not be any restriction on cross-holding between an operator holding access spectrum for terrestrial networks and an operator holding spectrum for any kind of satellite communication.

In the event, TRAI decides to frame the cross-holding norms for satellite communication services then , within satellite communication, cross-holding restrictions should apply i.e. one operator providing satellite based communication services should not be allowed to hold equity in another legal entity providing satellite based communication services.

Q27. Keeping in view the provisions of ITU's Radio Regulations on coexistence of terrestrial services and space-based communication services for sharing of same frequency range, do you foresee any challenges in ensuring interference-free operation of space-based communication network and terrestrial networks (i.e., microwave access (MWA) and microwave backbone (MWB) point to point links) using the same frequency range in the same geographical area? What could be the measures to mitigate such challenges? Suggestions may kindly be made with justification.

Airtel Response:

Airtel concurs with DoT that, "*Coexistence of satellite networks or satellite-based communication within the country is ensured through various provisions in RR, ITU recommendations, WRC Resolutions, NFAP and License conditions for the satellite and MW services. ...as per the current practice to assign spectrum administratively, all frequency assignments/ operations are issued on non-interference/ non-protection basis*."

To mitigate interference, ITU prescribes varying measures in ITU-RR which have been duly captured in the TRAI consultation as well.

Hence in view of the above, there are mechanisms and processes that exist under the ITU framework[6] and global best practices that should be leveraged.

Q28. In what manner should the practice of assignment of a frequency range in two polarizations should be taken into account in the present exercise for assignment and valuation of spectrum? Kindly justify your response.

Airtel Response:

No comments.

Q29. What could be the likely issues, that may arise, if the following auction design models (described in para 3.127 to 3.139) are implemented for assignment of spectrum for user links in higher bands (such as C band, Ku band and Ka band)?

a. Model #1: Exclusive spectrum assignment
b. Model#2: Auction design model based on non-exclusive spectrum assignment to only a limited number of bidders
c. What changes should be made in the above models to mitigate any possible issues, including ways and means to ensure competitive bidding? Response on each model may kindly be made with justification.

Airtel Response:

Please refer to the response to Q4 and Q16.

The spectrum for user links in higher bands (such as C band, Ku band and Ka band) must be assigned on a non-exclusive basis, i.e., shared basis through an administrative process.

The likely issues that may arise, if the auction design model # 1 is implemented for assignment of spectrum for user links in higher bands (such as C band, Ku band and Ka band), are **covered in detail in the response to Q4 earlier. They are briefly re-iterated hereunder:**

- Satellite spectrum is globally shared, 'rights to use' for which are granted by the ITU.
- In the case of satellite spectrum, the same frequencies are shared for a range of services, satellite broadband, DTH, captive satellite use and governmental use.
- Exclusive assignment would necessarily fragment the spectrum and the technical nature of satellite services is such that they cannot be provided efficiently over fragmented spectrum.
- Fragmentation of satellite spectrum would necessarily mean wastage of the precious resource.
- The existing satellite architecture may be rendered useless if spectrum is not assigned on a non-exclusive/shared basis.

In addition, as highlighted in response to Q4, certain challenges will need to be overcome if an auction model of any kind – be it model # 1 (exclusive spectrum assignment) or model # 2 (non-exclusive spectrum assignment to only a limited number of bidders) – is implemented for the assignment of spectrum for user links in higher bands (such as C band, Ku band and Ka band). They are briefly reiterated hereunder:

[6] For detailed coordination of terrestrial stations operating in the bands shared with space service visit https://www.itu.int/en/ITU-R/terrestrial/fmd/Pages/coordination.aspx

- A satellite requires the same spectrum the world over – if an operator is not assigned the same frequency in India, it would not be able to serve Indian customers. Neither model # 1 nor model # 2 can ensure a favourable result for all operators.

- Satellite services require four types of frequencies – uplink and downlink each for gateways and user links. First, bundling of the four types of frequencies is not possible due to the different requirements of each operator. Second, without bundling, neither model # 1 nor model # 2 can ensure that an operator would be able to acquire all four types of frequencies in accordance with requirements.

- With such huge risk and uncertainty, no operator would be willing to make any investments for providing satellite coverage in India.

- Auctions, whether model # 1 or model # 2, would invariably result in an upward shift in prices. The satellite industry in India, which is at a very nascent stage currently, may not be able to bear such a burden.

- Consequently, both model # 1 and model # 2 would prove to be impediments for SATCOM, which is the only viable mode of bridging the digital divide.

- After recognition of the challenges involved in the auctioning of satellite spectrum, administrative allotment on a non-exclusive/shared basis is the mode of assignment favoured by administrations globally.

- Indian satellite operators would compete not just with each other, but also with foreign operators (for provision of services on aircrafts in international airspace and vessels in international waters). The auction of satellite spectrum in India for Indian players will put them at a disadvantage in comparison to the global competing operators who just have to pay an administrative fee for the resources required for providing the same service.

- Auctions – both model # 1 and model # 2 – would stifle any aspirations start-ups may have under the New Space Policy, which professes to encourage private participation in the satellite sector. Model # 2, especially, which envisages an auction on a non-exclusive basis, would be no auction at all. The phrase 'non-exclusive auction' is itself an oxymoron.

- Moreover, if the Indian authorities decide to limit the number of operators in their market for the purposes of increasing government revenue as envisaged under model # 2, it will negatively impact not only the satellite operators who do not obtain a license but also the consumers in India. **As a result, Indian consumers will have fewer choices compared to other markets. Reduced competition may impact consumer prices and adoption rates, further exacerbating the digital divide.**

No changes made in either model # 1 or model # 2 would be able mitigate the above issues, since satellite spectrum is – by its very nature – is unsuitable for auctioning. Thus, we reiterate, satellite spectrum should continue to be administratively allotted on a non-exclusive/shared basis.

Q30. In your opinion, which of the two models mentioned in Question 29 above, should be used? Kindly justify your response.

Airtel Response:

Please refer to the responses to Q4, Q16 and Q29.

None of the models mentioned in Question 29 should be used. Instead, the spectrum for user links in higher bands (such as C band, Ku band and Ka band) must be assigned on a non-exclusive basis through an administrative process.

Q31. In case it is decided to assign spectrum for user links using model # 2 i.e., non-exclusive spectrum assignment to limited bidders (n+ Δ), then what should be
a. the value of Δ, in case it is decided to conduct a combined auction for all services
b. the values of Δ, in case it is decided to conduct separate auction for each type of service
c. Please provide detailed justification.

Airtel Response:

Please refer to the responses to Q4, Q16, Q29 and Q30.

The spectrum for user and gateway links (such as C band, Ku band and Ka band) must be assigned on a non-exclusive basis through an administrative process.

Additionally, as for characterizing the model presented as a non-exclusive auction, in the case of limited bidders (n in number), the auction starting with the reserve price will end up selling the spectrum in the quoted reserve price, even though it is shared. Thereafter, all participants will have to pay the same price to acquire the same spectrum. There is no exclusivity here nor is the demand-supply dynamic characteristic of auctions present here. Therefore, in conclusion, this is nothing but an indirect equivalent to the administrative allocation.

Q32. Kindly suggest any other auction design model(s) for user links including the terms and conditions? Kindly provide a detailed response with justification as to how it will satisfy the requirement of fair auction i.e., market discovery of price.

Airtel Response:

Please refer to the responses to Q4, Q16 and Q29-31. There is no model suitable for auctioning the spectrum for user links (in bands such as C band, Ku band and Ka band).

Had any such model worked efficiently, regulators across the globe would have adopted it. Hence, it must be assigned on a non-exclusive basis through an administrative process.

It is respectfully submitted that if the regulator concerns itself only with the issue of market discovery of price in the matter of the provision of satellite-based services, then this whole consultation process is headed in the wrong direction. As explained above, there are other larger issues at stake.

Satellite based communications services is the only viable solution for bridging the digital divide and providing universal coverage. The socio-economic benefits are much higher than perceived revenue maximization efforts since broadband connectivity to all is the stated aim of the Government.

Thus, satellite spectrum should be assigned administratively on a non-exclusive basis only.

Q33. What could be the likely issues, that may arise, if Option # 1: (Area specific assignment of gateway spectrum on administrative basis) is implemented for assignment of spectrum for gateway links? What changes could be made in the proposed option to mitigate any possible issues?

Airtel Response:

Please refer to the responses to Q4, Q17 and Q19.

Spectrum for gateway links should be assigned on an administrative basis. This method has been successfully implemented in numerous countries around the world, ensuring efficient coordination and allocation of spectrum resources for satellite operators. However, area-specific administrative assignment of spectrum (for say, a district) could be done as only localized spectrum would be required for operation of gateways.

A satellite operator requires access to four frequencies, i.e., uplink and downlink each of them for the Satellite Earth Station Gateway (SESG) and the User Terminals (UT), respectively. The design will have to ensure availability of this entire combination lest it renders the use case for SATCOM meaningless if players fail to obtain adequate spectrum in all required links for service provisioning. A coordinated result of this nature is unlikely to be achieved through an auction process.

Moreover, every operator would have different requirements as to the quantum of spectrum in each of these four frequencies, depending on the kinds of services being offered by it. Thus, even bundling of the four kinds of frequencies for auction would not be possible since any bundling would be uniform and not as per the different requirements of different operators.

Hence, **spectrum for gateway should be assigned on an administrative and non-exclusive basis**. Globally, it is the only approach to managing satellite gateway spectrum. It ensures efficient spectrum utilisation, fosters competition and enables satellite operators to provide essential services that benefit society as a whole.

Q34. What could be the likely issues, that may arise, if Option # 2: Assignment of gateway spectrum through auction for identified areas/ regions/ districts is implemented for assignment of spectrum for gateway links? What changes could be made in the proposed option to mitigate any possible issues? In what manner, areas/ regions/ districts should be identified?

Airtel Response:

Spectrum for gateway links should be assigned on an administrative basis.

Auctions for gateway links even for identified areas/regions/districts are not a suitable approach for spectrum allocation in the satellite industry. As opposed to terrestrial networks, satellite operators require only a limited number of gateways to serve a large geographical area, such as India. In such cases, the scarcity of spectrum is not a pressing concern, and alternative allocation methods, such as administrative assignment, are more appropriate.

Moreover, the flexibility of gateway infrastructure allows for the coexistence of multiple satellite systems in the same location. Geostationary satellite operators (GSOs) can share gateway locations without causing interference or affecting the performance of their respective networks. Additionally, these GSO gateways can even be collocated with Non-Geostationary Satellite Orbit (NGSO) antenna farms, further demonstrating the efficient use of available resources.

Q35. In your view, which spectrum assignment option for gateway links should be implemented?

Airtel Response:

Please refer to the responses to Q4, Q17 and Q19. Spectrum for gateway links should continue to be assigned on an administrative basis.

By employing an administrative assignment approach instead of auctions for gateway links, policymakers can ensure the efficient use of spectrum resources, reduce potential conflicts among operators and promote the seamless operation of satellite networks. This approach also allows for a more focused consideration of public interest objectives and the unique technical requirements of satellite services, ultimately benefiting both the industry and consumers.

Hence, **spectrum for gateway should be assigned on an administrative basis**.

It may be noted that in a typical satellite constellation there will not be more than a few gateway locations. This will require very localized spectrum that too in radius of few KMs. Hence administrative allocation of Gateway spectrum can be restricted to some pre-defined KMs or a district. This will also ensure efficient use of spectrum.

Q36. Kindly suggest any other auction design model(s) for gateway links including the terms and conditions? Kindly provide a detailed response with justification as to how it will satisfy the requirement of fair auction i.e., market discovery of price?

Airtel Response:

Please refer to the responses to Q4, Q17 and Q19. There is no suitable model for auctioning the spectrum for gateway links. It must be assigned on a non-exclusive basis through an administrative process.

Q37. Any other issues/suggestions relevant to the subject, may be submitted with proper explanation and justification.

Airtel Response:

No comment.

Issues related to valuation of spectrum for space-based communication services:

Q38. In case it is decided for assignment of spectrum on administrative basis, what should be the spectrum charging mechanism for assignment of spectrum for space-based communications services

i. **For User Link**

ii. **For Gateway Link**

Please support your answer with detailed justification.

Airtel Response:

1. Last year, the DoT carried out crucial and significant reforms promoting ease of doing business for satellite based services, and bring it under minimal regulatory cost. Among reforms, DoT removed multiple regulatory charges/fees - NOCC charges for usage of Space Segment; MPVT Charge; and Annual Licence Fee for M2M/IoT devices for Captive VSAT Licences. The DoT also relaxed the spectrum usage charges methodology from a formula based to a percentage-based system (1%) for handset satellite phone services. These reforms have been carried out to promote satellite-based services in the country.

2. Subsequently, TRAI too, has also made its recommendations for zero licence fee under Satellite Earth Station Gateways Licence.

3. Since the satellite communication services sector is at a nascent stage; it would be appropriate to keep the burden of regulatory levy on the sector at the minimal, in line with recent Space reforms.

4. Thus, Airtel recommends that there should not be any charges for the assignment of spectrum for space-based communication services, especially when they would already be paying 8% Licence Fee on their revenue.

5. However, if the TRAI still considers imposing a separate spectrum usage charge, then it should be within range of 0.5%-1% of AGR at the maximum, to recover the cost of administering the spectrum.

Q39. Should the auction determined prices of spectrum bands for IMT /5G services be used as a basis for valuation of space-based communication spectrum bands

i. **For user link**

ii. **For gateway link**

Please support your answer with detailed justification.

And

Q40. If response to the above question is yes, please specify the detailed methodology to be used in this regard?

Airtel Response:

No, both are entirely different in terms of economic value, market size and exclusivity.

The terrestrial spectrum (IMT/5G) is allocated on an exclusive basis, while space-based communication spectrum bands are allocated on a non-exclusive basis.

Therefore, auction-determined prices of spectrum bands for IMT/5G services cannot be used as a basis for valuing space-based communication spectrum bands.

Q41. Whether the value of space-based communication spectrum bands

i. For user link
ii. For gateway link

be derived by relating it to the value of other bands by using a spectral efficiency factor? If yes, with which spectrum bands should these bands be related to and what efficiency factor or formula should be used? Please support your response with detailed justification.

Airtel Response:

No, Airtel is not aware of any situation in which a regulator has used spectral efficiency as a reference point to determine the value of spectrum for space-based communication.

The spectrum for user and gateway links (such as C band, Ku band and Ka band) must be assigned on a non-exclusive basis through an administrative process.

Q42. In case of an auction, should the current method of levying spectrum fees/charges for satellite spectrum bands on formula basis/ AGR basis as followed by DoT, serve as a basis for the purpose of valuation of satellite spectrum

i. For user link
ii. For gateway link

If yes, please specify in detail what methodology may be used in this regard.

Airtel Response:

No, it would not be feasible.

The spectrum for user and gateway links (such as C band, Ku band and Ka band) must be assigned on a non-exclusive basis through an administrative process. Further, as explained in our response to Q. No. 38, there should not be any spectrum usage charges for satellite-based services. If still decided to charge, then the SUC charge should be within the range of 0.5%-1% of AGR only.

Q43. Should revenue surplus model be used for the valuation of space- based spectrum bands

i. For user link
ii. For gateway link

Please support your answer with detailed justification.

Airtel Response:

No.

The Authority has used the revenue surplus model to estimate the maximum amount a service provider would be willing to pay for additional spectrum in a certain frequency band for IMT/5G services in terrestrial networks. This model is based on financial parameters and spectrum holdings, and it assumes that the net present value of projected revenue surplus over the next 20 years represents the maximum amount a service provider would pay. However, this model requires certain financial information about the space industry, such as revenue and operating expenditure (Opex), EBITDA margin, capital cost per subscriber, capacity utilisation, useful life of various network elements/assets, depreciation methodology and RoCE of the space segment. Unfortunately, this information is currently unavailable since the industry is still at a nascent stage.

The spectrum for user and gateway links (such as C band, Ku band and Ka band) must be assigned on a non-exclusive basis through an administrative process.

Q44. Whether international benchmarking by comparing the auction determined prices of countries where auctions have been concluded for space-based communication services, if any, be used for arriving at the value of space-based communication spectrum bands:

i. For user link

ii For gateway link

If yes, what methodology should be followed in this regard? Please give country-wise details of auctions including the spectrum band /quantity put to auction, quantity bid, reserve price, auction determined price etc. Please support your response with detailed justification.

Airtel Response:

No, please refer to our submission in the Preamble.

The spectrum for user and gateway links (such as C band, Ku band and Ka band) must be assigned on a non-exclusive basis through an administrative process.

The present approach of revenue sharing for commercial services would be an appropriate approach for India, and it would be helpful for growth, business sustainability and competition in the space segment. It should, however, be noted that the revenue opportunity from satellite communication is very low compared to that from terrestrial mobile services. For instance, typically, the annual revenue opportunity for a satellite communication player may not be more than Rs. 50-200 crores for the whole of India.

Q45. Should the international administrative spectrum charges/fees serve as a basis/technique for the purpose of valuation in the case of satellite spectrum bands

i. For user link

ii. For gateway link

Please give country-wise details of administrative price being charged for each spectrum band. Please specify in detail terms and conditions in this regard.

And

Q46. If the answer to above question is yes, should the administrative spectrum charges/fees be normalized for cross country differences? If yes, please specify in detail the methodology to be used in this regard?

And

Q47. Apart from the approaches highlighted above which other valuation approaches can be adopted for the valuation of space-based communication spectrum bands? Please support your suggestions with detailed methodology, related assumptions and other relevant factors.

And

Q48. Should the valuation arrived for spectrum for user link be used for valuation for spectrum for gateway links as well? Please justify.

And

Q49. If the answer to the above is no, what should be the basis for distinction as well as the methodology that may be used for arriving at the valuation of satellite spectrum for gateway links? Please provide detailed justification.

Airtel Response:

No. Please refer to the Preamble. The present approach of revenue sharing for commercial services would be an appropriate approach for India, and it would be helpful for business sustainability and competition in the space segment.

Q50. Whether the value arrived at by using any single valuation approach for a particular spectrum band should be taken as the appropriate value of that band? If yes, please suggest which single approach/ method should be used. Please support your answer with detailed justification.

And

Q51. In case your response to the above question is negative, will it be appropriate to take the average valuation (simple mean) of the valuations obtained through the different approaches attempted for valuation of a particular spectrum band, or some other approach like taking weighted mean, median etc. should be followed? Please support your answer with detailed justification.

And

Q52. Should the reserve price for spectrum for user link and gateway link be taken as 70% of the valuation of spectrum for shared as well as for exclusive assignment? If not, then what ratio should be adopted between the reserve price for the auction and the valuation of the spectrum in different spectrum bands in case

of (i) exclusive (ii) shared assignment and why? Please support your answer with detailed justification.

And

Q53. If it is decided to conduct separate auctions for different class of services, should reserve price for the auction of spectrum for each service class be distinct? If yes, on what parameter basis such as revenue, subscriber base etc. this distinction be made? Please support your answer with detailed justification for each class of service.

And

Q54. In case of auction based and/or administrative assignment of spectrum, what should the payment terms and associated conditions for the assignment of spectrum for space-based communication services relating to:

i. Upfront payment

ii. Moratorium period

iii. Total number of installments to recover deferred payments

iv. Rate of discount in respect of deferred payment and prepayment

Airtel Response:

Please refer to the Preamble. The current revenue sharing approach for commercial services would be appropriate for India. Given the revenue share model, the aforementioned questions would not be applicable.

The spectrum for user and gateway links (such as C band, Ku band and Ka band) must be assigned on a non-exclusive basis through an administrative process.

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