

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

www.airtel.in
Call: +91 124 4222222
Fax: +91 124 4248063



Ref No: RP/FY 15-16/62/ 180
Dated 21st December 2015

To,
Advisor (NSL),
Telecom Regulatory Authority of India,
Mahanagar Doorsanchar Bhawan,
Jawahar Lal Nehru Marg, Old Minto Road,
New Delhi - 110002

Kind Attention: Shri Sanjeev Banzal

Subject - Airtel response on the Consultation Paper on Valuation and Reserve Price of Spectrum in 700, 800, 900, 1800, 2100, 2300 and 2500 MHz Bands.

Reference: TRAI Consultation paper no. 6/2015 dated 26th November 2015

Dear Sir

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

Thanking you
Yours sincerely
For Bharti Airtel Limited

A handwritten signature in blue ink, appearing to read 'Ravi P. Gandhi', is written over a horizontal line.

Ravi P. Gandhi
Chief Regulatory Officer

Enclosed: As mentioned above

Response to TRAI's Consultation paper on "Valuation and Reserve Price of Spectrum in 700, 800, 900, 1800, 2100, 2300 and 2500 MHz Bands"

At the outset, we thank the Authority for starting this consultation exercise with an aim to determine the value of the most critical resource required for telecom operations.

In our view, this consultation paper has brought forth some very relevant questions that require immediate attention before we get down to the serious business of determining the valuation and reserve price of the spectrum.

It is worthwhile to mention that the market valuation of a spectrum band in a service area is dependent upon various factors such as demand & supply, business continuity, propagation characteristics, availability of network & device ecosystem and market size and its revenue earning potential. All these factors need to be kept in mind while deriving valuation and reserve price.

The last auction, conducted during Feb 2015, was primarily focused around business continuity due to extension of licenses in a majority of service area and huge demand-supply gap. Almost entire spectrum put up for auction in 1800 MHz and 900 MHz band was related to the licenses, which were due for expiry between the year 2014 to 2016. At that time, the operators whose licenses were expiring, were grappling with the question of business continuity wherein their inability to acquire back the spectrum would have resulted in shutting down of their operations. The closing market value as derived in the auction also showed such a correlation. For example, in service areas such as UP(East) & UP(West) where only 6.2 MHz was put for auction in 900 MHz band, and the demand supply gap clubbed with need for business continuity led to escalation of final price to be as high as 3.4 to 4.3 times of the reserve price. In contrast, in the LSAs of Andhra Pradesh, Karnataka & Maharashtra wherein demand supply gap was lesser; the final price was around 1.5 times of the reserve price. In light of the above, the market value of the spectrum as derived from the last auction, needs to be seen in the right perspective while we undertake the current exercise of valuation and reserve price of the spectrum in various bands. Since there is no incumbency of the spectrum in 700 MHz, 2100 MHz, 2300 MHz and 2500 MHz bands, therefore, the valuation in these bands should not be benchmarked with final price derived in auction conducted during Feb 2015.

Further, the following key issues need to be resolved during the current spectrum auction process:

- A. Timing of auction in 700 MHz band
- B. Spectrum Cap
- C. Spectrum Interference
- D. Spectrum Harmonization
- E. Allocation of the contiguous spectrum

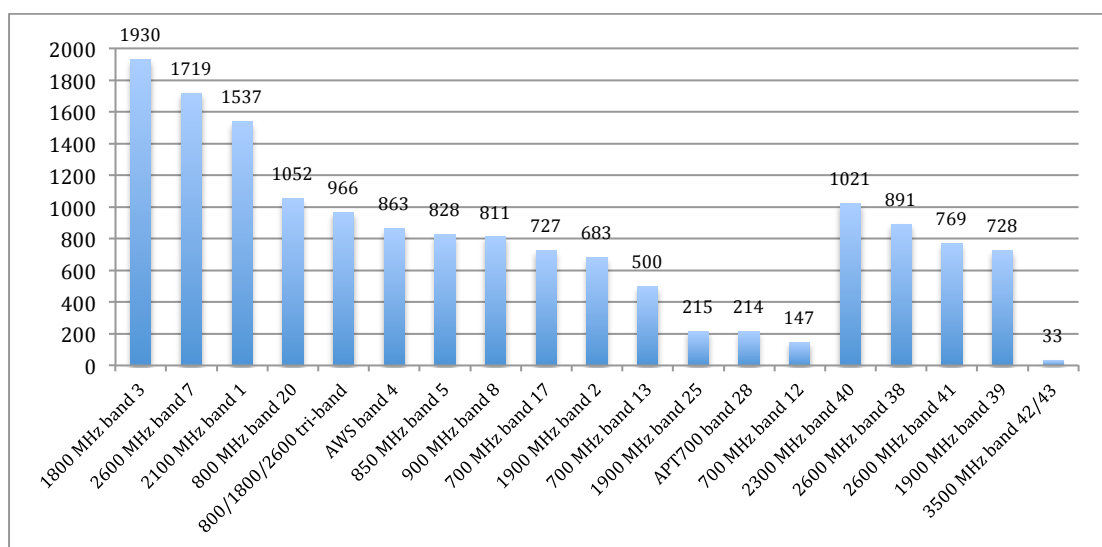
A. Timing of auction in 700 MHz band:

The spectrum in 700 MHz band due to its excellent propagation characteristics has been designated as digital dividend band and will play a crucial role in the expansion of broadband in the rural parts of the country. However, the development of ecosystem i.e. supporting network and devices plays an important role in the adoption of any band, and they should be considered while deciding the timing of auction of any spectrum band.

Ignoring the development of ecosystem results in underutilization of spectrum and blocking of funds, which could have otherwise been invested in expanding the current network. In India, we have already witnessed the sale of 2300 MHz band ahead of its time, which has resulted in delay in the network rollout by nearly five years and has also resulted in blocking of enormous quantum of funds. Had these funds been directed towards the acquisition of the spectrum in other mature bands such as 800/900/1800/2100 MHz, it would have helped the operators to contribute more in the expansion of mobile broadband services.

In the present context, the possibility of quick adoption of APT 700 MHz band by the masses in India appears to be a bit incongruous as it lacks the device ecosystem necessary for its proliferation. While adoption of APT 700 by 42+ countries across regions indicate the commitment and its future prospects, it is worthwhile to recognize that network and device ecosystem in this band is still at a nascent stage. To illustrate;

- Out of 442 LTE/ LTE-A commercial networks launched in 147 countries, only 12 commercial LTE networks have been deployed in the APT 700 band (band 28) in five countries viz. Taiwan, Australia, New Zealand, and Panama & Papua New Guinea.
- Out of 3745 LTE user-devices only 214 supports APT 700 (Band 28) i.e. a mere 5.7% of the total LTE user devices.



Thus, any immediate auction of the spectrum in 700 MHz band will lead to underutilization of the spectrum for several years and will block industry's funds, which are critically required for network rollout.

Therefore, we request the Authority to recommend **the auction of the spectrum in this band only after the development of a strong device ecosystem.**

B. Spectrum Cap:

In March 2015 auction, the spectrum caps for many service areas were lower than the ceilings mandated during the February 2014 auctions. Later, it was made apparent that the caps had been lowered due to non-consideration of the spectrum surrendered by some of the operators while determining the spectrum cap. This reduction in spectrum caps impacted Airtel while acquiring spectrum for Karnataka, Delhi and Mumbai service areas, where we were not allowed to bid and buy the required spectrum while some spectrum in these LSAs went unsold.

We would recommend following on the various issues related to determination of spectrum cap:

1) Overall Spectrum Caps be increased:

The objective of placing this restriction is to ensure that a minimum of four mobile operators continues to operate in the cellular market. It is highly unlikely and impractical to assume that all operators would have equal spectrum holdings. Therefore, an overall spectrum cap of 25% will result in either the spectrum remaining unsold or being fragmented among a large number of operators.

Further, to promote consolidation in the telecom sector, the Government released the merger & acquisition guidelines under which mergers are allowed until the market share (subscriber and revenue) of merged entity is up to 50%. However, the present spectrum cap of only allows operators to hold up to 25% of the total spectrum.

Currently, some operators have more than 30% market share and continue to grow. An overall spectrum cap of 25% is stifling the growth of operators although such growth is not considered as anti-competitive or market concentration from the competitive perspective.

Telecom operators require a large quantum of the spectrum to meet national objectives of 'broadband for all'. Inadequate quantum of spectrum holdings is adversely affecting the ability to offer better quality of services to their customers as the networks are overloaded in many circles. This situation is compounded due to imposition of spectrum cap at an unreasonably low level of 25%.

We, therefore, request the Authority that the **overall cap for spectrum holding be increased from current 25% to 33% of the total spectrum holding spread across all bands.**

2) Intra-band spectrum cap of 50% should be continued for each band:

The Authority, in its consultation paper, has rightfully acknowledged that the spectrum caps are typically designed and enforced to prevent spectrum concentration in the hand of one or two operators. The current intra-band cap of 50% has effectively served the interest of competition and the Industry. It not only avoids spectrum concentration in a particular band with a single operator but also enables others to acquire adequate/proportionate spectrum in every band.

Further, intra-band spectrum cap of 50% has worked well for different bands, i.e. 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2300 MHz etc. and the same should be prescribed for 700 MHz and 2500 MHz band also.

Acceptance of any proposal to combine the spectrum bands for calculation of caps would lead to concentration of the spectrum in those bands, especially in 800 MHz and 2300MHz band with one operator and therefore, will skew the market in favor of one operator.

3) Spectrum Caps should remain constant and only increase with time:

Based upon the availability of spectrum and prevailing spectrum caps, operators procure spectrum and commit huge investments towards the deployment of networks. Any reduction in spectrum caps will;

- Force operators to reduce their spectrum holdings and impact the investment made in network deployment.
- Will require the operator to surrender spectrum acquired after paying huge sum of money.
- Impact their long-term plan by reducing their ability to procure additional spectrum in subsequent auctions.

It is therefore, imperative that **spectrum caps should either remain constant or be revised upwards irrespective of any eventuality.**

4) Spectrum Cap to be declared at the starting of the year

The caps as defined in the NIA are applicable only to the operators participating in the auction. But other transactions, i.e. Mergers & Acquisitions, Spectrum Trading and Spectrum Sharing to also require the operators to adhere to the spectrum caps. To bring transparency and clarity, it is recommended that the spectrum caps be defined at the beginning of the year, say in the beginning of each financial year. The defined spectrum caps would then become the guiding caps in case of any events / transactions such as spectrum trading, spectrum sharing and M&A activity. This will

eliminate any ambiguity, which may arise due to asymmetrical information. The said spectrum caps may be revised upward in case of availability of the additional spectrum for commercial communication from defense/ government.

C. Ensuring spectrum is free from interference:

It is a reasonable expectation of the Industry that the spectrum being auctioned at any given point of time should be interference free so that operators are able to deploy network and provide interference-free service across the circles. However, the Industry has witnessed massive interference in 2100, 1800 & 900 MHz band, the spectrum of which was allocated to various operators during last auctions. For example, Airtel is facing heavy interference in 2100 MHz spectrum allocated to it in Jammu Region of Jammu & Kashmir service area and has been unable to launch services on the 3G network despite paying auction determined price and having a ready network since 2011. Similarly, Airtel network in Mumbai is having severe interference in 900MHz band allocation.

We, therefore, propose that **the operators facing interference in their existing spectrum in 2100 MHz band, should be first allocated alternate spectrum from the pool of newly available 2100 MHz spectrum** and then the remaining spectrum should be put for auction. This should, likewise, be applicable for spectrum in other bands as well.

D. Harmonize spectrum in 1800 MHz band and put available spectrum to auction:

Post agreement with Defence, DoT is left with 2x55 MHz of the spectrum in 1800 Mhz band. Currently, an average of 45 MHz of the spectrum is only made available to the operators with the actual assignment varying from 35-55 MHz in different service areas. The table below indicates the spectrum availability consequent upon the harmonization of the spectrum in 1800 MHz band:

Circle Name	Spectrum available consequent to Harmonization (in MHz)
Andhra Pradesh	0.40
Assam	20.45
Bihar	12.65
Delhi	15.00
Gujarat	9.00
Haryana	7.90
Himachal Pradesh	11.95
Jammu & Kashmir	34.30
Karnataka	4.40

Kerala	2.55
Kolkata	6.20
Madhya Pradesh	5.10
Maharashtra	9.55
Mumbai	2.60
North East	10.70
Orissa	2.50
Punjab	11.55
Rajasthan	8.40
Tamil Nadu	-
Uttar Pradesh (East)	7.75
Uttar Pradesh (West)	15.10
West Bengal	20.85
Total	218.90

As indicated in the table above, consequent upon the harmonization of spectrum, approximately, 220 MHz spectrum in the 1800Mhz band will become available.

The need for 1800 MHz band spectrum for mobile broadband networks is further accentuated since it is globally harmonized band for deployment of LTE networks. Out of 442 commercial LTE/ LTE-A network deployed worldwide in 147 countries; 192 operators (43.4%) in 92 countries/ territories have commercially launched LTE networks using 1800 MHz. Similarly, out of 3745 LTE user devices, 1930 user devices (more than 50%) support LTE-1800 MHz. The widespread deployment of LTE-1800 networks and availability of user devices for LTE-1800 leads to better adoption of the services by the masses. It is therefore, important that all available spectrum in 1800 MHz band should be made available in contiguous blocks. We recommend that **harmonization of the spectrum in 1800 MHz band be concluded at the earliest.**

E. Allocation of the contiguous spectrum to an operator with 2 or more blocks in 2100 MHz band:

Assignment of contiguous spectrum blocks in 2100 MHz band will help in efficient utilization of spectrum and better user experience. Therefore, Authority is requested to consider and recommend the following provisions in the NIA;

- In case an operator already having 1-2 blocks of the spectrum in 2100 MHz band and bids for additional blocks then government should assign the spectrum such that to make it contiguous with their existing spectrum by the harmonization process; or
- Alternately, by shifting their existing assignment to the new/vacant blocks and making it contiguous with the new assignment through the current auction.

- In case an operator bid for two or more blocks, then they should be allocated those blocks as a contiguous spectrum irrespective of their rank, etc.

Further, BSNL was assigned 2100 MHz frequencies ranging from 1964-1969 MHz (with corresponding downlink frequencies) in all service areas barring five service areas (viz. Bihar, HP, J&K, Punjab, WB). While, 15 MHz (paired) spectrum will be made available by Defence, it is likely that the BSNL will be required to shift from its present assignment into the telecom band. We propose that in the five service areas, BSNL be shifted as per the depiction below:

3G Spectrum Frequency (in MHz)	1925	1930	1935	1940	1945	1950	1955	1960	1965	1970	1975	1980
Bihar (as on date)				1935-1940					1959-1964	1964-1969	1969-1974	1974-1979
Bihar (proposed)				1939-1944	1944-1949	1949-1954	1954-1959	1959-1964	1964-1969	1969-1974	1974-1979	
HP (as on date)				1934-1939					1959-1964	1964-1969	1969-1974	1974-1979
HP (proposed)				1939-1944	1944-1949	1949-1954	1954-1959	1959-1964	1964-1969	1969-1974	1974-1979	
J & K (as on date)				1934-1939					1959-1964	1964-1969	1969-1974	1974-1979
J & K (proposed)				1939-1944	1944-1949	1949-1954	1954-1959	1959-1964	1964-1969	1969-1974	1974-1979	
Punjab (as on date)				1934-1939					1959-1964	1964-1969	1969-1974	1974-1979
Punjab (proposed)				1939-1944	1944-1949	1949-1954	1954-1959	1959-1964	1964-1969	1969-1974	1974-1979	
WB (as on date)			1928-1932						1959-1964	1964-1969	1969-1974	1974-1979
WB (proposed)				1939-1944	1944-1949	1949-1954	1954-1959	1959-1964	1964-1969	1969-1974	1974-1979	
	Vacant	Airtel	RCOM	Vodafone	Idea	Aircel	BSNL	Tata	STEL			

We would recommend that the NIA should have an enabling provision for assignment of the contiguous spectrum for efficient utilization of the spectrum.

Our response on the various issues raised in the consultation paper are presented below:

- Q1. Whether the entire spectrum available with DoT in the 800 MHz band be put for auction? Justify your answer.**
&
Q2. How can the spectrum in the 800 MHz band, which is not proposed to be auctioned due to non-availability of inter-operator guard band, be utilised?

Bharti Airtel's Response:

We recommend that every assignable spectrum in 800 MHz should be put to auction.

Q 3. What should be the block size in the 700 MHz band?

Bharti Airtel's Response:

Without prejudice to our submission that it is not the right time to auction 700 Mhz band, we would recommend a **block size of 2x5 MHz**.

700 MHz band is a digital dividend band and will be utilized for deployment of IMT technologies such as LTE/ LTE-A, which in turn would require the spectrum in the blocks of 5, 10, 15 & 20 MHz for delivering the broadband experience. 2x 5 MHz being the highest common factor for these configurations is therefore recommended.

Q 4. Whether there is any requirement to change the provisions of the latest NIA with respect to block size and minimum quantum of spectrum that a new entrant/existing licenses/expiry licensee is required to bid for in 800, 900, 1800 and 2100 MHz bands. Please give justification for the same.

&

Q 5. What should be the block size in the 2300 MHz and 2500 bands?

Bharti Airtel's Response:

• Block Size:

As per the provisions of January, 2015 NIA in respect of 800, 900, 1800 & 2100 MHz bands and 2010 NIA in respect of 2300 & 2500 MHz band, following block size was adopted for different bands:

Band	Block Size
800 MHz	1.25 MHz (paired)
900 MHz	0.2 MHz (paired)
1800 MHz	0.2 MHz (paired)
2100 MHz	5 MHz (paired)
2300 MHz	20 MHz (unpaired)
2500 MHz	20 MHz (unpaired)

Since the above-mentioned block sizes have worked satisfactorily, we do not foresee any requirement changing the provisions in respect of block size. We, therefore, propose that **the same block size as adopted in January 2015 NIA in respect of 800, 900, 1800 & 2100 MHz bands and 2010 NIA in respect of 2300 & 2500 MHz band be continued.**

Minimum quantum of the spectrum:

While we are in broad agreement with the provisions of January 2015 NIA with respect to minimum quantum of the spectrum available with a new entrant/ existing licenses/ expiry licensee is in respect of 800 MHz, 900 MHz, 1800 MHz and 2100 MHz bands. However, a few exceptions may be required keeping in view the availability of spectrum

being even lower than 0.6 MHz in 900 MHz band. We would recommend that in those exceptional cases, the minimum amount of the spectrum allowed should be reduced from 0.6 MHz to 0.2 MHz in 900 MHz & 1800 MHz for existing licensees.

Following table shows the detailed provisions suggested in respect of minimum quantum of the spectrum in different bands:

S No	Spectrum Band	License Category	Minimum quantum to bid
1	800 MHz	New Entrant	- 4 blocks, in those LSAs where 4 or more blocks are available - 3 blocks, in those LSAs where less than 4 blocks but equal to 3 blocks is available. - 2 blocks, in those LSAs where less than 3 blocks but equal to 2 blocks is available [Block size - 1.25 MHz (paired)]
		Existing Licensee	1 block. [Block size - 1.25 MHz (paired)]
2	900 MHz	New Entrant	5 MHz (paired)
		Existing Licensee	- 0.6 MHz (paired) if spectrum available is greater than 0.6 MHz (paired) - 0.2 MHz (paired) if spectrum available is less than 0.6 MHz (paired)
3	1800 MHz	New Entrant	5 MHz (paired)
		Existing Licensee	- 0.6 MHz (paired) if spectrum available is greater than 0.6 MHz (paired) - 0.2 MHz (paired) if spectrum available is less than 0.6 MHz (paired)
4	2100 MHz	New Entrant	5 MHz (paired)
		Existing Licensee	5 MHz (paired)
5	2300 MHz	New Entrant	20 MHz (un-paired)
		Existing Licensee	20 MHz (un-paired)
6	2500 MHz	New Entrant	20 MHz (un-paired)
		Existing Licensee	20 MHz (un-paired)

- Q 6. Considering the fact that one more sub-1 GHz band (i.e. 700 MHz band) is being put to auction, is there a need to modify the provisions of spectrum cap within a band?
&
- Q 7. Is there any need to specify a separate spectrum cap exclusively for the spectrum in 700 MHz band?
&
- Q 8. Should a cap on the spectrum holding within all bands in sub-1 GHz frequencies be specified? And in such a case, should the existing provision of band specific cap (50% of total spectrum assigned in a band) be done away with?
&
- Q 9. Should 2300 MHz and 2500 MHz bands be treated as same band for the purpose of imposing intra-band Spectrum Cap? Please support your suggestions for Q6 to Q9 with proper justifications.

Bharti Airtel's Response:

The Authority, in its consultation paper, has rightfully acknowledged that the spectrum caps are typically designed and enforced to prevent spectrum concentration in the hands of one or two operators. **The current intra-band cap of 50% has effectively served the interest of consumer, competition and the Industry and should be extended to 700 MHz and 2500 MHz bands also.** It not only avoids spectrum concentration in a particular band with a single operator but also enables others to acquire adequate/proportionate spectrum in all bands.

The section below entails issues with a separate sub-1 GHz band cap and considering 2300 MHz & 2500 MHz band as a same band for intra-band spectrum cap;

- **Sub-1 GHz Cap:**

The proposal of doing away with the band specific cap for sub-1 GHz bands and prescribing a cap on spectrum holding within all bands in sub-1 GHz frequencies will seriously affect competition and level playing field and are not desirable for the reasons listed below:

- The proposal of a separate cap for Sub-1 GHz bands in a market of 7-13 operators will empower a single operator to acquire an excessive/disproportionate amount of the spectrum in a particular Sub-1 GHz band creating its monopoly/dominance over the spectrum in a specific band.
- Importantly, while sub-1 GHz bands (700, 800 and 900 MHz band) are considered more efficient due to their better propagation characteristics, these spectrum bands are not directly substitutable due to distinct ecosystems. These spectrum bands are used for offering distinctive technologies viz. 700MHz for LTE (not for 2G and 3G services), 800MHz for CDMA and LTE (not for GSM services) and 900MHz for 2G

and 3G services. Therefore, any operator would require spectrum in every sub-GHz band for offering various services/technologies.

- During the last few auctions, when a substantial amount of the spectrum in 900 MHz was assigned, the operators were subjected to band specific cap. Had the new spectrum cap been implemented during the last spectrum auction, we could have bid for the entire 15.6 MHz in Punjab, 14 MHz in Andhra Pradesh, 12.4 MHz in HP and 6.2 MHz in Bihar in 900 MHz band spectrum.
- We believe that changing these rules midway is illegal, unconstitutional and anti-competitive. The proposed sub 1 GHz cap would only help one operator, who has not even launched its services, to grab/consolidate entire spectrum in 800 MHz band and create a non-level playing field.
- To illustrate, presently 12.5- 16.25 MHz of the spectrum in 800 MHz band has been assigned in various circles and intra-band spectrum cap of 50% restricts any operator from holding more than 6.25- 8.125 MHz. Any proposal of replacing the intra band cap of 50% with a sub 1GHz cap will allow the operator to hold all spectrum in the premium 800 MHz band.

We, therefore, strongly believe that the proposal of a separate spectrum cap of Sub-1 GHz band will only serve the interest of a single operator and enable it to grab excessive spectrum in a particular Sub-1 GHz band, e.g. 800 MHz band.

We recommend that the present intra-band spectrum caps of 50% should be continued and extended to spectrum in 700 MHz band in the larger interest of consumers, competition and the Industry.

- **Spectrum Cap for 2300 MHz and 2500 MHz bands:**

2300 MHz and 2500 MHz bands should be considered as separate bands for the reasons enlisted below:

- Two bands have a completely different device ecosystem and therefore, treating 2300 MHz and 2500 MHz bands as one band for intra-band cap may result in one operator acquiring a disproportionate amount of the spectrum in one of the bands viz. 2300 MHz/ 2500 MHz or consolidate spectrum in the 2300 MHz band, which will create one operator's monopoly over that particular spectrum band.
- Even though spectrum in 900 MHz and 1800 MHz are considered inter-changeable historically and been used for offering same services/technology in overlapped network and are subjected to common rollout obligations, but these are still treated as different bands for the purpose of spectrum cap. Therefore, we find no rationale for treating these two bands common for Intra-band spectrum cap.

We believe that the proposed changes in spectrum cap, i.e. sub 1 GHz band and 2300/2500 MHz band will lead to consolidation of spectrum in 800 MHz & 2300 MHz band and will benefit only one operator. The fact that this was not done for all prior auctions is a very serious and significant change of auction rules mid way giving us no chance to acquire more spectrum in a band that was recently auctioned - 900 MHz. Clearly this will be tantamount to the creation of a non-level playing field based on a new set of criteria, which are arbitrary and illegal.

We therefore recommend that **the current intra-band cap of 50% be continued and shall also be extended to any new band, e.g. 700 MHz and 2500 MHz band.**

Q 10. Suggest an appropriate coverage obligation upon the successful bidders in 700 MHz band? Whether these obligations be imposed on some specific blocks of spectrum (as was done in Sweden and UK) or uniformly on all the spectrum blocks?

&

Q 11. Should it be mandated to cover the villages/rural areas first and then urban areas as part of roll-out obligations in the 700 MHz band?

Bharti Airtel's Response:

The network and device ecosystem for APT 700 MHz band is still at a nascent stage. At this stage, the network and device costs are high; therefore, any mandate to deploy network using 700 MHz band in rural and remote areas will be a non-starter. Further, high cost of user devices will be a big deterrent in its adoption, especially in rural and remote areas.

Considering the device ecosystem in 700 MHz band as compared to 800/900 MHz band, it may be cheaper and economical for an operator to cover such remote areas with 800/ 900 MHz band as compared to 700 MHz band and any stringent rollout obligations in respect of 700 MHz will worsen its adoption prospects. Therefore, rollout obligations in respect of 700 MHz band need to be lenient and should not be more stringent than that applicable for 800 MHz and 900/ 1800 MHz bands.

Further, the rollout obligations in respect of 800 MHz and 900/ 1800 MHz band have been recently changed during November 12 auctions to impose additional obligations to cover 30% of the BHQs to cater to coverage in remote/ rural areas.

700MHz band like 800 MHz and 900/1800 MHz band will also be used for providing voice and mobile broadband. Therefore, we propose that the **rollout obligations for 700 MHz may be kept similar to that of 800 MHz and 900/ 1800MHz bands.**

Q 12. In the auction held in March 2015, specific roll-out obligations were mandated for the successful bidders in 800 MHz, 900 MHz, 1800 MHz and 2100 MHz spectrum bands. Stakeholders are requested to suggest: (a) How the roll-out obligations be modified to enhance mobile coverage in the villages? Which of the approaches discussed in para 2.58 should be used? (b) Should there be any roll out obligation

for the existing service providers who are already operating their services in these bands. Please support your answer with justification.

Bharti Airtel's Response:

- a) The rollout obligations for 800/900/1800 and 2100MHz have been modified during the last spectrum auctions to make it more stringent as compared to the previous / old rollout obligations. For example, in 800 MHz and 900/ 1800 MHz band, additional rollout obligations have been mandated to cover 30% of BHQs and similarly in respect of 2100 MHz band, additional rollout obligations in respect of 20% DHQs/ towns have been specified.

Since the rollout obligations have been revised, and attuned recently and operators are in a process of completing it, we recommend that these obligations should be retained without any change.

- b) The existing operators have acquired the spectrum at a price while keeping in view the rollout obligations. Mandating any additional rollout obligations for the spectrum procured for additional capacity will inhibit such acquisitions. We are, therefore, of the view that **no additional rollout obligations be mandated on an existing licensee acquiring additional spectrum in the band.**

Q 13. In the auction held in 2010, specific roll-out obligations were mandated for the successful bidders in 2300 MHz spectrum band. Same were made applicable to the licensee having spectrum in 2500 MHz band. Stakeholders are requested to suggest:

- (a) Should the same roll-out obligations which were specified during the 2010 auctions for BWA spectrum be retained for the upcoming auctions in the 2300 MHz and 2500 MHz bands? Should both these bands be treated as same band for the purpose of roll-out obligations?**
- (b) In case existing service providers who are already operating their services in 2300 MHz band acquire additional block of spectrum in 2300 or 2500 MHz band, should there be any additional roll out obligation imposed on them?**

Bharti Airtel's Response:

- a) Currently, the rollout obligations for 2300 MHz band are quite stringent and specify coverage of 50% rural SDCAs compared to other spectrum bands. Apart from this, the Authority itself has recognized that the ecosystem in 2300 MHz band has not fully developed and stated as under:

"As the eco-system in this band is still not fully developed, it is less likely that any new entrant will come in this band"

Similar issues of immature network ecosystem and low device availability apply to 2500 MHz band as well. It is therefore, logical that **the rollout obligations for 2300 MHz and 2500 MHz be kept akin to those specified for 800 MHz and 900/1800 MHz bands.**

Since, 2300 MHz and 2500 MHz are being auctioned as two different bands, it is therefore, prudent that **spectrum in 2300 MHz and 2500 MHz bands be treated as different bands for roll out obligations.**

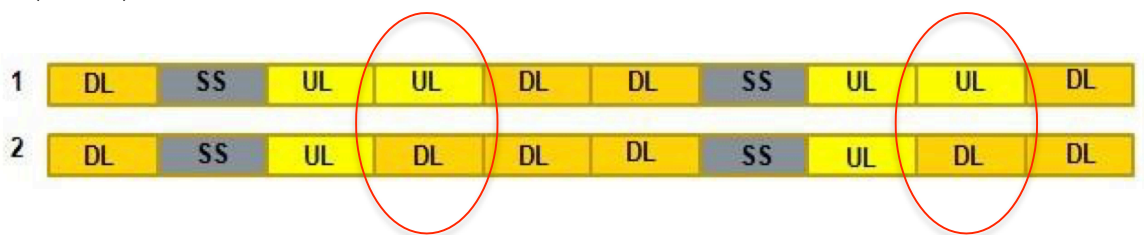
- b) The rollout obligations for 2300 MHz and 2500 MHz band spectrum band were quite stringent during last spectrum auction in 2010. Therefore, we propose that **no additional rollout obligations be imposed on existing operators, if they acquire an additional spectrum block in the same band.**

Q 14. Keeping sufficient guard band or synchronization of TDD networks using adjacent spectrum blocks are the two possible approaches for interference management. Considering that guard band between adjacent spectrum blocks in 2300 MHz band is only 2.5 MHz in a number of LSAs, should the network synchronization amongst TSPs be mandated or should it be left to the TSPs for the interference free operation in this band? Please support your suggestion with proper justifications.

Bharti Airtel’s Response:

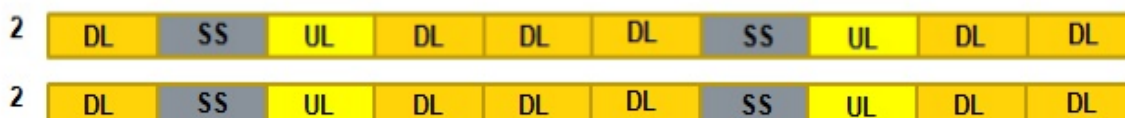
We may consider the following two examples to understand the issue better:

- a. **Operator A operating in Configuration 1 (i.e. 2:2) and Operator B in Configuration 2 (i.e. 3:1):**



Two operators operating in different configurations lead to UL/DL interference.

- b. **Operator A and Operator B operating in same TDD Configuration (say 3:1) :**



When both the operators operate on same configuration, there is no interference.

It may be inferred from above that the best way to eliminate interference between two operators operating in TDD configuration is to have same configuration and timing synchronization.

Additionally, we would like to suggest that:

- Radio frames must be synchronized to avoid DL/UL overlapping as shown in above figure. It is important that both the TDD LTE networks are synchronized with either GPS or 1588v2 standards and maintain the frequency synchronization requirement of +/- 50 parts per billion with BTS sync recovery to keep an accuracy of +/-15 ppb (to guarantee +/- 50ppb in the radio interface) and a phase sync requirements of +/- 1.5us.
- TDD Configuration mismatch will lead to BTS-BTS & UE-UE Interference.
- Since carrier separation is not adequate in most of the circles to avoid interference due to the TDD configuration mismatch between operators in these circles (10 out of 22 circles have only 2.5 MHz separation & 11 circles have less than 10 MHz), operators are required to coordinate in respect of TDD LTE Radio configuration to avoid interference in each other's network.
- Operators have been assigned different spots across different circles, which leads to cross border interference. In order to reduce interference, it is recommended to have same spot assigned to an operator across all circles.

We recommend that network synchronization, and same configuration must be mandated among TSPs & any usage by non-telecom/ enterprise users, for the interference-free operation in these bands.

Q 15. In case, synchronization of the TDD networks is to be dealt by the regulator/licensor, what are the parameters that the regulator/licensor should specify? What methodology should be adopted to decide the values of the frame synchronization parameters?

Bharti Airtel's Response:

Network synchronization among TSPs and configuration should be mandated by the regulator/ licensor to enable interference-free coexistence.

Spectrum in 2300 MHz and 2500 MHz will be used for broadband applications/ data where asymmetric capacities are required with downlink data speeds greater than uplink data speeds, we recommend mandating a **TDD configuration of 3:1 & GPS based synchronization.**

Q 16. If synchronization of the TDD networks is ensured, is there a need for any guard band at all? If no guard band is required, how best the spectrum left as inter-operator guard band be utilised?

Bharti Airtel's Response:

If synchronization of LTE-TDD networks is implemented among all networks deployed by TSPs and non-telecom / enterprise users, there is no need for any guard band.

Q 17. Whether the ISP category 'A' licensee should be permitted to acquire the spectrum in 2300 and 2500 MHz bands or the same eligibility criteria that has been made applicable for other bands viz. 800 MHz, 900 MHz, 1800 MHz and 2100 MHz band should be made applicable for 2300 MHz and 2500 MHz bands also?

Bharti Airtel's Response:

Only UASL/CMTS/UL (Access Service Authorization) should be allowed to bid for spectrum in 2300 MHz and 2500 MHz band for the reasons enlisted below:

- Majority of ISP-A operators who bought 2300 MHz spectrum under ISP have migrated or have applied for migration to Unified License (Access Authorization). For example, RJIO, Qualcomm (Airtel), Augere, etc. Tikona is the only ISP-A having BWA spectrum.
- Similar technologies as deployed in other access bands (LTE/LTE-A) are being deployed in 2300 MHz & 2500 MHz band. However, spectrum acquired by an ISP-A licensee limits its ability to provide comprehensive services unlike the access service providers due to restrictions in the service license.
- Unlike in 2010, a Pan India Unified License with Access Authorization only costs Rs. 15 Crores.

Considering the above, **eligibility criteria for all bands should be made similar and 2300 & 2500 MHz band be allowed only to CMTS/ UASL/ UL (Access Authorization).**

Q 18. Stakeholder are requested to comment on (a) Whether the guidelines for liberalisation of administratively allotted spectrum in 900 MHz band should be similar to what has been spelt out by the DoT for 800 and 1800 MHz band? In case of any disagreement, detailed justifications may be provided. (b) Should the liberalization of spectrum in 800, 900 and 1800 MHz be made mandatory?

Bharti Airtel's Response:

- a) **Liberalization & harmonization guidelines for 900 MHz band should be similar to liberalization & harmonization guidelines for 800 MHz and 1800 MHz band.**
- b) In line with the guidelines for liberalization of the spectrum in 800MHz and 1800 MHz band, the guidelines for liberalization & harmonization of the administrative spectrum in 900 MHz band should also be optional. **There is no case for making liberalization of spectrum in 900 MHz mandatory.**

Q 19. Can the prices revealed in the March 2015 auction for 800/900/1800/2100 MHz spectrum be taken as the value of spectrum in the respective band for the

forthcoming auction in the individual LSA? If yes, would it be appropriate to index it for the time gap (even if this is less than one year) between the auction held in March 2015 and the next round of auction and what rate should be adopted for indexation?

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- Q 20. If the answer to Q.19 is negative, should the valuation for respective bands be estimated on the basis of various valuation approaches/methodologies adopted by the Authority (as given in Annexure 3.1) in its Recommendations issued since 2013 including those bands (in a LSA) for which no bids were received or spectrum was not offered for auction?**

Bharti Airtel's Response:

Yes, we believe that the prices discovered in the last spectrum auction should be taken as valuation of the spectrum in 800 MHz, 900 MHz & 1800 MHz bands. No indexation is required over and above the price discovered in last auction as the prices have been discovered in March 2015 and are less than a year-old.

However, in 2100 MHz band, while the spectrum was put up for auction in only 17 service areas out of 22, spectrum was finally sold in only 14 service areas. We, therefore, recommend the following valuation for 2100 MHz band:

- 14 service areas wherein spectrum was sold, and market discovered price is available; the same should be taken as its valuation.
- 3 service areas viz. Delhi, Mumbai and Andhra Pradesh, wherein spectrum remained unsold; the valuation may be taken as 50% of the reserve price as was followed for 800 MHz band during the March, 2013 auctions.
- 5 service areas viz. Bihar, HP, J&K, Punjab and WB, wherein spectrum was not put up for auction in 2015, the final price as discovered in 2010 may be taken as the valuation.

- Q 21. Should the value of 700 MHz spectrum be derived on the basis of the value of 1800 MHz spectrum using technical efficiency factor? If yes, what rate of efficiency factor should be used? Please support your views along with supporting documents/literature.**

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- Q 22. Should the valuation of 700 MHz spectrum be derived on the basis of other sub-GHz spectrum bands (i.e. 800 MHz/900 MHz)? If yes, what rate of efficiency factor should be used? Please support your views along with supporting documents/literature.**

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- Q 23. In the absence of financial or non-financial information on 700 MHz, no cost or revenue based valuation approach is possible. Therefore, please suggest any other valuation method/approach to value 700 MHz spectrum band along with detailed methodologies and related assumptions.**

Bharti Airtel's Response:

The value of a spectrum band is governed not only by its propagation characteristics but also with the availability of device and network ecosystem, demand & supply, business continuity and revenue earning potential in the service area.

Availability of devices is one of the most important factors in deriving the value of the spectrum in that band. Both 800 MHz and 900 MHz band, which are comparable to 700 MHz band in terms of propagation characteristics, have a very well-developed ecosystem. While 800 MHz band has a well-developed ecosystem for CDMA & LTE and 900 MHz band has a well-developed ecosystem for GSM and WCDMA, 700MHz band can only be used for LTE network. The network and device ecosystem for APT 700 MHz band is at a nascent stage with an adoption of only 3% in respect of LTE networks and only 5.7% LTE user devices supporting this band. In such a scenario, an early auction of this band will lead to a situation wherein the spectrum will be underutilized for several years. We have already witnessed this phenomenon in 2300 MHz band wherein even after passage of five years of auction, all networks have not even launched their services commercially.

We, therefore, suggest that the Authority should recommend auction of this band only after the network and device ecosystem matures. In case the Authority takes a view otherwise and recommends an early auction, following suggestions may kindly be considered;

- a) We recommend that the value of 700 MHz band be 50% of the market discovered price of 800 MHz band, considering that the LTE ecosystem in APT 700 MHz is yet to be developed, and hence operators might be forced to keep this spectrum underutilized/unutilized for a considerable period of time.
- b) Further, if the Authority considers mandating stringent rollout obligations for 700 MHz band to cover rural/non-remunerative areas as compared to that prescribed for 800/ 900 MHz band, the same should also be duly factored in and consequently, spectrum valuation should be further reduced.

Q 24. Should the value of May 2010 auction determined prices be used as one possible valuation for 2300 MHz spectrum in the next round of auction? If yes, then how? And, if not, then why not?

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Q 25. Should the value of the 2300 MHz spectrum be derived on the basis of the value of any other spectrum band using the technical efficiency factor? If yes, please indicate the spectrum band and technical efficiency factor with 2300 MHz spectrum along with supporting documents.

Bharti Airtel's Response:

The final price for 2300 MHz band in May 2010 may be used as its valuation. No further indexation is required over the market discovered price considering the fact that the

ecosystem in this band is not fully developed and even after five years the networks could not be launched completely. This has been acknowledged by the Authority also.

Q 26. Should the valuation of the 2500 MHz spectrum be equal to the valuation arrived at for the 2300 MHz spectrum? If no, then why not? Please support your comments with supporting documents/ literature.

Bharti Airtel's Response:

Spectrum in both 2500 MHz band and 2300 MHz band is being auctioned as an unpaired spectrum. Further, propagation characteristics of 2500 MHz can be compared with the 2300 MHz band due to both being next to each other. Considering this, it is reasonable and justified to assume valuation of 2500 MHz as equivalent to spectrum in 2300 MHz band.

Q 27. Is there any other method/approach than discussed above that could be used for arriving at the valuation of 700/800/900/1800/2100/2300/2500 MHz spectrum bands or any international auction experience/ approach that could be used for valuation of any of these bands? Please support your suggestions with detailed methodology and related assumptions.

Bharti Airtel's Response:

No other valuation method is required as the market price deduced in the last auction is the most appropriate approach to arrive at the valuations.

Q 28. As was adopted by the Authority in September 2013 and subsequent Recommendations and adopting the same basic principle of equal-probability of occurrence of each valuation, should the average valuation of the spectrum band be taken as the simple mean of the valuations obtained from the different approaches/methods attempted for that spectrum band? If no, please suggest with justification that which single approach under each spectrum band, should be adopted to value that spectrum band.

Bharti Airtel's Response:

We suggest that the price derived in last auction be used for valuation.

Q 29. What should be the ratio adopted between the reserve price for the auction and the valuation of the spectrum in different spectrum bands and why?

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Q 30. Should the realized prices in the recent March 2015 auction for 800/900/1800/2100 MHz spectrum bands be taken as the reserve price in respective spectrum bands for the forthcoming auction? If yes, would it be appropriate to index it for the time gap (even if less than one year) between the auction held in March 2015 and the forthcoming auction? If yes, then at which rate the indexation should be done?

Bharti Airtel's Response:

The Authority has consistently adopted a ratio of **0.8** for arriving at the reserve price. We, therefore, recommend that reserve price should be fixed at 80% of the spectrum valuation.