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

No. RP/ FY 12-13/062/ 011

Dated: 14th August, 2013

To,

Shri Arvind kumar
Advisor (NSL)
Telecom Regulatory Authority of India,
Mahanagar Door Sanchar Bhawan,
J.L. Nehru Marg, (Old Minto Road),
New Delhi – 110 002

Sub: Consultation Paper on Valuation and Reserve Price of Spectrum

Ref: TRAI Consultation Paper No. 6/2013, dated 23.07.2013

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

Ravi P. Gandhi
Chief Regulatory Officer (Policy)

Encl : As Above

Bharti Airtel's Response to TRAI's Consultation paper on "Valuation and Reserve Price of Spectrum"

At the outset, we would like to thank the Authority for initiating the much needed consultation process on "Valuation and Reserve Price of Spectrum".

We would also like to place on record our sincere appreciation for an objective, progressive and fair consultation paper that includes all the relevant and critical issues facing the industry. We sincerely hope that the present consultation process will culminate in forward looking recommendations that would enable the industry to meet the policy objectives enshrined in the National Telecom Policy 2012.

The vision of the National Telecom Policy 2012

The National Telecom Policy 2012 has articulated a very ambitious vision for the industry - *"To provide secure, reliable, affordable and high quality converged telecommunication services anytime, anywhere for accelerated inclusive socio-economic development."*

The policy emphasizes the power of the 'broadband information highway' to transform the lives of people and envisages 175 million broadband customers by 2017 and 600 million by 2020.

With over 850 million wireless consumers and a mere 30 million wireline consumers, it is obvious that wireless is going to be the driver of broadband growth. Clearly, the catalyst for broadband growth is going to be the management and policy framework to do with spectrum – a very scarce and precious national resource.

We believe that there must be a clear set of five guiding principles that should be considered while framing this policy. It is important that these principles stand the test of time and create a win-win for all stakeholders - consumers, government and industry.

These principles are:

1. Ensuring adequate spectrum, so as to provide quality broadband services
2. Ensuring affordable and consistent quality of services to consumers
3. Maximizing the overall revenue for the exchequer in the long term
4. Ensuring the sound financial health of the industry, so as to drive investments
5. Ensuring an enduring and non-discriminatory policy framework

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

It is a well known fact from the experience around the world that data growth is exponential, requires large availability of spectrum and is decoupled from revenue growth. In fact, today, even in India, data volume with a consumer penetration of less than 20% is almost equal to voice volume (in MBs) despite contributing only 5-7% of wireless revenues. In recognition of this, in 2010, the Authority had projected a requirement of 600 MHz of

additional spectrum by 2014. Similarly, as a part of the 12th Five Year Plan, the Telecom Sector Working Group projected a spectrum demand of 800 MHz by 2015. We believe that the additional spectrum required by the Indian mobile industry could be 900-1000 MHz by 2015 and over 2000 MHz by 2022.

Against this backdrop, we believe there are three critical enablers to meet this demand in future. First, availability of spectrum needs to be in line with demand and a roadmap for this must be shared with the stakeholders so as to bring clarity to the industry. Second, adequate availability of spectrum needs to be ensured to each TSP to avoid needless fragmentation of holdings. Third, the efficient utilization of spectrum granted should be ensured through a framework of optimal management of spectrum band along with a policy to share and trade spectrum.

2. **Ensuring affordable and consistent quality of services to consumers:**

Provision of seamless continuity and undisrupted and consistent quality of service to consumers should be of paramount importance to the government as well as industry. This is the basic telecom promise, and its importance in building and maintaining consumer and investor trust cannot be overstated.

We believe that there are three key enablers to meet this objective. First, to encourage participation in the auction, the reserve price should be set at a level that is not a deterrent to serious players. Second, the price of spectrum (upfront and recurring) needs to be set at an optimal level. Failure to do so will result in an immediate increase in tariffs thereby impacting affordability. In addition, it will inhibit the required investment in infrastructure and technology. Third, continuity and consistency of services needs to be ensured. Withdrawing 900 MHz spectrum holdings from existing TSPs will result in disruption of services to more than 500 million consumers due to coverage gaps and inferior quality of service.

3. **Maximize the overall revenue for the exchequer in the long term:**

The last two spectrum auctions conducted in November 2012 and March 2013 saw a major portion of spectrum remaining unsold due to exorbitant and unsustainable reserve prices. The unsold spectrum resulted in substantial loss of revenue opportunity to the exchequer. It bears repeating that there are two streams of revenue for the exchequer – the upfront spectrum charge and the recurring charges in the form of spectrum usage charge and license fee. To maximize revenue, both these streams must be seen in conjunction and not in isolation.

We believe that there are four key enablers to maximizing revenues for the exchequer. First, all available spectrum should be offered at a reasonable reserve price in order to realize upfront revenue from its sale. The total spectrum put up for auction must include spectrum that has been returned voluntarily, spectrum that is underutilized with TSPs, spectrum

available post cancellation of licenses, E-GSM spectrum and spectrum lying with the Defence and other government bodies. Second, investments by TSPs need to be encouraged so that there is rapid growth of broadband and recurring revenue share for the government. Third, a lower rate of spectrum usage charge should be ensured, given that the upfront spectrum charge is market determined. Fourth, by doing all this, an environment must be created to catalyze rapid broadband growth, thereby maximizing revenues for the exchequer while also realizing higher economic growth for the nation.

4. **Ensure sound financial health of the Industry so as to drive investments:**

To support the broadband revolution, we estimate that the industry may need to invest over Rs 2,00,000 Crs. over the next five years. These investments will be towards spectrum, infrastructure and backhaul including RoW, which will become increasingly important as data grows.

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

Looking at the current financial precariousness of the industry, making these investments will not be feasible unless the price of spectrum is reasonable and affordable. The price of spectrum must be determined by demand and supply through a transparent and vibrant auction. In addition, unless there is a framework that allows sharing, trading and consolidation of spectrum there is a likelihood that spectrum may not be utilized and investments may be held back.

We believe that there are four key enablers to ensure sound financial health of the industry. First, a reasonable reserve price needs to be set, which enables demand and supply to determine the final price in a transparent and rational manner. Second, the total cost of spectrum for TSPs must be viewed as a combination of the upfront spectrum price and the recurring spectrum usage charges. Third, sharing and trading should be allowed for efficient utilization of spectrum. Fourth, a sound merger and acquisition policy must be put in place. The policy should encourage healthy competition, while also utilizing precious spectrum efficiently with the ultimate objective of ensuring quality telecom services to more and more consumers.

5. **Ensure an enduring and non-discriminatory policy framework:**

As licences come up for extension from 2014 onwards, it is important to have a consistent and non-discriminatory policy and approach towards determining the quantum and valuation of spectrum.

We believe that there are two key enablers to ensuring an enduring and non-discriminatory policy framework. First, the total cost of spectrum needs to be equitable for all TSPs across the period of their license / spectrum. This can be achieved by a low, flat and uniform spectrum usage charge independent of the quantum of spectrum / technology / revenue. Second, the policy should facilitate incremental investments in existing spectrum throughout the term of license and allowed extension thereafter.

Considering the above, we would like to make the following submission on the questions raised by the Authority in the consultation paper:

Q1. What method should be adopted for refarming of the 900 MHz band so that the TSPs whose licences are expiring in 2014 onwards get adequate spectrum in 900/1800 MHz band for continuity of services provided by them?

&

Q2. In case spectrum is to be reserved for such TSPs, should it be restricted to licenses expiring in 2014 (metros) or include licenses expiring afterwards (LSA other than metros)?

Bharti Airtel's Response:

The alternatives being proposed by the Authority for carrying out refarming of spectrum, have wide implications. These include disruption of an existing and well established network that serves a large consumer base of more than 500 million consumers on 900 MHz band, continuity of service for these consumers and major financial ramifications for the industry.

We believe that unless these implications are addressed and resolved, the proposed alternatives of refarming are not in the interest of either consumers; government or industry. We, therefore, urge the Authority to consider our alternative proposals.

Further, while considering any form of refarming, it is also extremely important to consider the relevant clauses of the UAS/CMTS license w.r.t. the period/term of the existing Licenses and allocated spectrum.

As per clause 4.1 of the UAS/CMTS License, these licenses along with the allocated spectrum, are for a term of 20 years, with the express provision of extension by 10 year periods thereafter. It is, therefore, evident that the incumbent TSPs have a legal right to extension along with the allocated spectrum (including 900 MHz). Based on the legal right of extension of the license along with allocated spectrum, and continuity of business beyond 20 years, TSPs have made massive investments towards network infrastructure and other costs.

In this context, it was a surprise that the DoT chose to include our spectrum in the March 2013 auction. Our Writ petition challenging the decisions rejecting our request for extension by DoT is pending final disposal before the Delhi High Court.

Therefore, without prejudice to our rights in the above Writ petition, our responses to your queries are detailed below:

1. **Extension of License and Spectrum:**

- In the present consultation paper, the Authority has rightly acknowledged (vide para 1.8) the principles laid down in the NTP-99, which awarded Licenses for an initial period of 20 years, extendable by additional periods of 10 years at one time thereafter.

- It submitted that these licenses have been allocated through a competitive bidding process and are bundled with spectrum. It is, therefore, evident that the extension of the existing licenses on expiry of initial term would also include corresponding extension of the bundled spectrum allocated to the licensee in both the 900 MHz/ 1800 MHz band. Since spectrum is the "heart and soul" and "basic feature" of the licenses issued till date, any extension of these licenses without spectrum is as good as denial of the licensee's legal right of extension, which is enshrined in the license itself.

- Based on the terms of clause no. 4.1 of the UAS license & NTP-99, it is our view that the extension of license along with the allocated spectrum is our legal right and including existing spectrum in the upcoming auction is incorrect.

2. **Impact of withdrawal of spectrum in 900 MHz band:**

Globally, the term 'refarming' is used when either the spectrum usage is changed from non-commercial to commercial, or is changed from one technology to the other. In our submission, the proposed exercise of refarming is neither of the two. TRAI's proposal of withdrawing spectrum from one TSP and assigning it to another TSP (post auction) is actually "redistribution" of spectrum.

Highlighted below is the impact of withdrawal of spectrum from TSPs on the consumer, the industry, the nation and the overall objectives of the government:

a. **Impact on Consumer:**

Due to the progressive policies of the government, consumers currently enjoy superior quality yet affordable telecom services with vast coverage. It is our view that re-distribution will be a regressive step and will impact consumers adversely – especially on parameters like **affordability and consistent quality of services. This is detailed below**:

- **Disruption of services:** Withdrawal of 900 MHz from the existing TSPs will force these TSPs to migrate their GSM network to 1800 MHz band, resulting in major

coverage gaps. Re-planning and installation of the network in 1800 MHz band includes surrendering/removing the existing BTS sites, installing a large number of new sites and optimization of the network thereof. Obtaining new sites is a challenging task, especially in metros/big cities. All this will result in huge customer inconvenience during the interim state when the 900 MHz network is switched off and before all the sites required in 1800 MHz band network are installed and the network optimized. While it is inevitable that another TSP will come in and offer services on the redistributed 900 MHz spectrum; getting back to the same coverage levels will take precious time since networks will need to be optimized and configuration of sites will need to undergo changes. This will lead to disruption of services, which is clearly not the intent of the Policy.

- **Coverage gaps affecting QoS for consumers**: Coverage gaps will have an adverse impact on QoS and will also result in un-connecting the connected. Due to transition from 900 MHz network to 1800 MHz network, the TSPs will not be able to meet the stringent QoS parameters set up by the Authority in the short term. In addition to QoS issues for the consumer, the TSPs will have to pay hefty penalties for non-compliance with the QoS regulations.

- **Affordability/ increase in tariff:** The additional capex and opex cost due to migration from 900 MHz network to 1800 MHz network will result in consequent increase in tariffs, thereby impacting affordability.

b. **Impact on the financial health of the industry:**

In the event of non-allocation of existing spectrum in the 900 MHz band during license extension, the TSPs impacted by this decision will be forced to deploy the supplementary network in 1800 MHz band. Since the propagation characteristics of 1800 MHz band are poor as compared to 900 MHz band, provision of similar coverage will require 171,954 additional base stations in rural areas where the availability of electricity is negligible and diesel consumption is very high.

To continue providing the services to their existing consumers using spectrum in 1800 MHz band, the existing TSPs will have to rollout new sites, the cost of which has been estimated by Analysys Mason as over Rs. 54,739 Crs. towards capex and an additional Rs. 11,762 Crs. (annually) towards opex. The magnitude of this will negatively impact the financial health of the industry and its ability to attract investments. Over and above this cost, there will be a needless write-off of over Rs. 22,310 Crs. as existing TSPs on 900 MHz network switch off their base stations and migrate to 1800 MHz network.

All of this at a time when the industry is already in a financially precarious position is a matter of grave concern and has the potential of seriously undermining investor confidence.

c. **Impact on national objectives:**

- Telecom industry is at the cusp of exponential growth of broadband services. To meet the NTP-2012 objectives of providing affordable mobile services, 100% rural penetration/ubiquitous coverage and broadband for all, TSPs are required to focus on rolling out broadband networks. Any redistribution of 900 MHz spectrum would require TSPs to shift their focus to reconfiguration of their existing networks, primarily catering to voice services. This will delay investments in driving **broadband** growth and will not be in line with national objectives.

- **Impact on the environment/ Green Telecom Regulation:** The government is promoting greener networks and has come up with certain mandates via the Green Telecom Regulation. In our endeavour to build a greener network, our company has been constantly working with the partner tower companies, towards reduction of green house gas emissions. As a result, our company's CO2 emission per terabyte reduced by 11% in the year 2011-12 over 2010-11.

  Unfortunately, the proposed re-distribution exercise will result in increasing the number of BTSs, thereby increasing the greenhouse gas emissions. Assuming an average consumption of 11,500 litres of diesel every year per tower, adding more towers will result in an additional diesel consumption of 1.2 billion litres of diesel annually. This increase is in stark contrast to the reduction in diesel consumption over the last few years.

  On an average, a telecom tower requires 6 kWh - 8 kWh of energy per hour for two TSPs, which will lead to an additional 1 GWh of electricity consumption per year. For every litre of diesel, about 2.48 kg of CO_2 is emitted and for every KWh of grid electricity consumed, 0.84 Kg of CO_2 is emitted. As per our estimate, the additional 1,71,954 BTS will result in an incremental 5.4 million tons of CO_2 emitted per year contributing to the already alarming issue of environmental pollution which is against public interest.

3. **International benchmarks w.r.t. refarming of spectrum:**

We believe that it may also be helpful to look at some international benchmarks w.r.t refarming / redistribution of spectrum while shaping this policy. A look at these throws up three critical facts that deserve consideration while shaping this policy:

- **Re-distribution has mainly occurred to bring in a new TSP**: Countries such as Denmark, France, Sri Lanka and Sweden have gone down this path. However, **it is important to note that all these countries had an average of just 4 operators.**

- In all these countries, there has been only **a partial surrender of 900 MHz spectrum** leaving behind a significant quantum with existing TSPs (7.5MHz or more) to ensure continuity of service. (Annexure-1 with details).
- As per our information, there are no examples anywhere in the world, where there has been a complete withdrawal of 900 MHz spectrum from existing TSPs.

In India, the sub 1 GHz band had been divided into two bands i.e. 900 MHz band and 800 MHz band with approximately 20 MHz of spectrum in each band.

The holding of 800/ 900 MHz in terms of number of circles and the relative VLR/ MHz for the two bands compared together is as below:

Sub-1GHz band		Bharti	Vodafone	MTNL/ BSNL	Idea	Aircel	Reliance	Tata	MTS	Avg.
800 MHz	No. of LSAs	0	0	22	0	0	22	19	9	
	VLR Subs (in '000)/ MHz	0	0	26.84	0	0	359.58	198.67	206.40	216.25
900 MHz	No. of LSAs	15	12	22	9	4	7	0	0	
	VLR Subs (in '000)/ MHz	1108.21	1040.49	259.87	1153.09	734.84	542.74	0	0	746.44

Note:

1. The subscriber base is as per TRAI Performance Monitoring Report of December 2012. VLR percentage is as per monthly subscribers report for December 2012.
2. It has been assumed that subscribers are being served proportionate to the quantum of spectrum held in 1800 MHz and 900 MHz in the same circle to arrive at the VLR subscribers for 900 MHz band.

The data in the table above and the details of vacant spectrum (indicated by the Authority in table 2.13) suggest that while most of the TSPs have access to sub-1 GHz band:

- the average utilization of spectrum (VLR subs/ MHz) in 800 MHz band is 28% of the utilization of spectrum in 900 MHz band and;
- an average of 8-10 MHz of spectrum is lying vacant in 800 MHz band.

Given the above spectrum holdings and low utilization of spectrum in 800 MHz band, we propose the following alternatives that will enable the Authority to discover the price of 900 MHz spectrum with TSPs whose licenses come up for extension in 2014 and thereon.

Proposal – 1:

- Since, the demand of 800 MHz (CDMA) is fast diminishing and the demand for 900 MHz (GSM/WCDMA) is on the rise, the Authority should consider shifting of 10 MHz spectrum (880-889 MHz) from 800 MHz band and aligning it with 900 MHz band (as E-GSM band) by changing its pairing. The details of this proposal are in response to Q4.

- Such realignment/refarming of CDMA spectrum to E-GSM band would increase the availability of spectrum in 900 MHz band from 25 MHz to 35 MHz while retaining 10 MHz of spectrum in 800 MHz band for continuity of services for the existing (but fast shrinking) consumer base.

- Since License coupled with spectrum is technology neutral, TSPs can use spectrum in both 800/900 MHz band for any technology, i.e. 2G, 3G, LTE etc. This will enable the GSM operators to migrate to 3G/WCDMA in their 900 MHz band and the CDMA operators to provide 3G/WCDMA or 4G/LTE in their existing 800 MHz band.

- Auction the E-GSM spectrum as 900 MHz band. Such an auction will meet two objectives:
  - It will provide an opportunity to interested TSPs to acquire the sub 1 GHz band spectrum.
  - Further, it will help in determining the value of 900 MHz band which can then be applied to the existing licensees at the time of extension of their license along with allocated spectrum in 900 MHz band.

In our view, the above proposal would obviate the need for the proposed refarming/redistribution.

Proposal – 2:

In addition to Proposal-1, the existing TSPs could be allowed to retain only 5 MHz of sub GHz band at the time of extension. The balance spectrum could be put to the auction along with E-GSM spectrum. For continuity of existing mobile services and for meeting the QoS requirement, spectrum deficit created due to retention of only 5 MHz of spectrum in 900 MHz band should be recouped through reservation of spectrum in 1800 MHz band.

In response to question 2, we believe that the government should have a complete roadmap for availability of spectrum as the licenses come up for extension. This is essential for ensuring continuity of services. In the event there is ambiguity on the availability of spectrum at a future date, then the government should reserve spectrum for all licenses coming up for extension post 2014 as well.

Q3. Is any restriction required to be imposed on the eligibility for participation in the proposed auction?

Bharti Airtel's Response:

The eligibility for participation in the proposed auction should be as per the January 2013 Notice Inviting Application. With respect to cap on spectrum holding, we believe that the spectrum put to auction should be included in the 'total spectrum assigned' in any service area. Further, TDD spectrum should be counted as half, for the purpose of determining the cap e.g. 20 MHz of TDD spectrum should be treated as 10 MHz of FDD (10+10).

While formulating the policy on eligibility for participation in the proposed auction, we believe that it is crucial for the government to ensure:

1. Efficient utilization of spectrum via allocation of adequate block size of spectrum
2. Minimal fragmentation of holding via adequate availability of spectrum

1. **Efficient utilization of spectrum via allocation of adequate block size of spectrum:**

It is well understood that spectrum is a scarce resource. It is, therefore, imperative for the government to ensure optimal utilization of spectrum at all times.

Block size for 900/1800 MHz band: In our view, the block size of 1.25 MHz is not suitable for deployment in majority of available technologies. While 3G/WCDMA are supported in 5 MHz, which is a multiple of 1.25 MHz; 4G/LTE is also supported in block sizes of 1.4 MHz / 3 MHz and none of these are multiples of 1.25 MHz. The block size of 1.25MHz is, therefore, not suitable for GSM, 4G/LTE and even for fractional 3G/HSPA (3.8 MHz) and is likely to result in serious underutilization and wastage of spectrum. GSM technology uses spectrum in the block size of 200 KHz, which is not a factor of 1.25 MHz. Considering that maximum spectrum has been allocated to the GSMA operators and will continue to be utilized for GSM technology for a substantial portion of the term of spectrum allocation, such wastage of scarce spectrum is not justified and needs immediate attention.

By contrast, the bandwidth required for both 3G/WCDMA and 4G/LTE can be in multiples of a lower block size of 200 KHz, which is used in all GSM networks. A lower channel size of 200 KHz provides the necessary flexibility to TSPs to buy spectrum in multiples of 200 MHz as per their actual requirement thereby reducing their cost as well as the wastage that would occur on account of unutilized spectrum.

With the above rationale in mind, we believe that both "New Entrants" as well as "Existing Licensees" (holding a UAS/ CMTS/ UL (AS) License) should be allowed to bid for spectrum in the 1800 MHz/900 MHz band as per block size of 200 KHz.

The bidding eligibility proposed by us for 900 / 1800 MHz band is as under:

<table>
<tr><th>S. No.</th><th>Category</th><th>Minimum Blocks</th><th>Maximum Blocks</th></tr>
<tr><td>1</td><td>New Entrant</td><td rowspan="2">25 blocks of 200 KHz (paired)</td><td rowspan="4">Subject to spectrum holding capping rule</td></tr>
<tr><td>2</td><td>Existing Licensee with spectrum in 800 MHz band</td></tr>
<tr><td>3</td><td>Existing Licensee with spectrum in 900 /1800 MHz band</td><td rowspan="2">5 blocks of 200 KHz (paired)</td></tr>
<tr><td>4</td><td>Extension Licensee with spectrum in 900/1800 MHz band</td></tr>
</table>

While the existing GSM operators may be permitted to acquire minimum 1 MHz in 900 MHz/1800 MHz band; however, market discovered price of either 900/1800 MHz band should be deemed as the market determined price **only when** any operator acquires minimum 5 MHz.

2. **Minimal fragmentation of holding via adequate availability of spectrum:**

It is crucial that while framing the rules for spectrum auction, the Authority takes into consideration a long-term view on the availability of spectrum per operator, in line with international benchmarks and national requirements.

Globally, policymakers ensure that telecom operators attain the requisite economies of scale required for efficiency in the market. It is recognized that the competitive health of the telecom market cannot be measured by the number of operators alone, but rather by the extent to which competition delivers sustainable long-term economic and social benefits. Therefore, worldwide, the emphasis has always been on providing large blocks of spectrum to TSPs rather than distributing it in smaller blocks.

The Authority has observed in Para 2.27 of the Consultation paper, that the average allocation across the European region is in the order of 71.6 MHz FDD (across the 800, 900, 1800, 2100 and 2600 MHz ranges). On a band-specific basis, the aggregate spectrum bandwidth allocations to service providers across Europe are around 20.5 MHz in 900 MHz band and 30.6 MHz in 1800 MHz band.

It is well recognized that fragmented spectrum results in inefficient utilization of spectrum, creates scarcity and eventually results in an artificial increase in price. That is why, globally, the entry of new operators is considered and deliberated upon very carefully.

It is also worth taking into account that the next telecom revolution is likely to result in the widespread adoption of wireless broadband. This broadband revolution is critically dependent on adequate availability of spectrum. In the event of a likely spectrum deficit, further fragmentation of spectrum between a larger numbers of players is likely to result in inefficient use of this scarce resource.

In data, unlike voice, there is a decoupling effect. In voice, MoU and spectrum move in tandem largely with revenues whereas in data, GB and spectrum move abruptly i.e. consumption takes a steep increase, which is not followed by a corresponding increase in revenues.

We request the Authority to take cognizance of the abovementioned submissions while finalizing the aspect of eligibility.

Q4. Should India adopt E-GSM band, in view of the diminishing interest in the CDMA services? If yes,

a) How much spectrum in the 800 MHz band should be retained for CDMA technology?

b) What are the issues that need to be addressed in the process?

c) What process should be adopted for migration considering the various issues involved?

Bharti Airtel's Response:

Yes, we recommend that India should adopt the E-GSM band as soon as possible, as it will lead to more efficient utilization of spectrum in 800 MHz band and maximization of overall revenue for the exchequer in the long run. More importantly, it will free up spectrum that could be used for growth of broadband, which is clearly in the national interest. It will also obviate the need for withdrawal of 900 MHz spectrum from the existing TSPs, which would have otherwise, resulted in disruption of services to consumers.

Globally, 880-889 and 925-934 MHz band is known as the 'extended 900 MHz band' and is a part of the overall GSM 900 MHz band. A list of 33 countries, which have adopted E-GSM band as 900 MHz band, is attached as Annexure-2. In India, however, E-GSM band has been historically used for CDMA services.

Given the higher demand for 900 MHz band clubbed with the diminishing demand for 800 MHz band, in our view, the government should harmonize 800 MHz band and make the 10 MHz of E-GSM band a part of the overall 900 MHz band. Additionally, this E-GSM spectrum should be included in the upcoming auction. This exercise will not only lead to better spectral efficiency, but will also benefit the exchequer by selling E-GSM spectrum on the same terms as 900 MHz band.

a) **Spectrum to be retained in the 800 MHz band for CDMA technology**

While earmarking the 800 MHz spectrum for CDMA technology, we urge the Authority to consider the following:

- There should be no adverse effect on the continuity of services to the CDMA subscribers.
- Presently the total allocated spectrum in CDMA is 245 MHz. A total of 192.43 MHz is free and should be used for E-GSM - Table below
- Due to a diminishing subscriber base, the CDMA operators are unlikely to meet the subscriber linked criteria; therefore excess spectrum held by them should also be added to the 192.43 MHz of already available free CDMA spectrum.

Therefore, in our view a maximum of 10 MHz of 800 MHz spectrum across all circles should be retained for ensuring continuity of service for CDMA subscribers in long run.

in MHz

S. No.	LSA	No. of Carriers Assigned*	No. of Operators except PSUs	Amount of spectrum assigned in CDMA	Spectrum left for E-GSM spectrum auction	Spectrum surrendered by one of the dual technology operator (*)	Spectrum left for liberalization in EGSM post considering spectrum surrendered by one of the dual technology operator (**)
1	Delhi	11	3.00	15.71	4.29	1.25	5.54
2	Mumbai	8	2.00	11.42	8.58	1.25	9.83
3	Kolkata	10	3.00	14.48	5.52	1.25	6.77
4	Maharashtra	8	2.00	11.42	8.58	2.50	10.00
5	Gujarat	9	3.00	13.25	6.75	1.25	8.00
6	AP	7	2.00	10.19	9.81	2.50	10.00
7	Karnataka	10	3.00	14.48	5.52	1.25	6.77
8	Tamil Nadu	9	3.00	13.25	6.75	1.25	8.00
9	Kerala	10	3.00	14.48	5.52	1.25	6.77
10	Punjab	8	3.00	12.02	7.98	1.25	9.23
11	Haryana	6	2.00	8.96	11.04	2.50	10.00
12	UP - West	10	3.00	14.48	5.52	1.25	6.77
13	UP - East	7	2.00	10.19	9.81	1.25	10.00
14	Rajasthan	10	3.00	14.48	5.52	1.25	6.77
15	M.P.	6	2.00	8.96	11.04	-	10.00
16	West Bengal	8	3.00	12.02	7.98	-	7.98
17	H.P.	4	2.00	6.50	13.50	-	10.00
18	Bihar	7	2.00	10.19	9.81	1.25	10.00
19	Orissa	5	2.00	7.73	12.27	-	10.00
20	Assam	4	2.00	6.50	13.50	-	10.00
21	North East	4	2.00	6.50	13.50	-	10.00
22	J&K	4	2+ Defence	7.10	12.90	-	10.00
Total					195.69	22.50	192.43

Note:

(*) One of the dual technology operator has reportedly surrendered 1.25 MHz in 800 MHz band in 12 circles and 2.5 MHz in 3 circles.

(**) This does not include the excess spectrum in 800 MHz band being held by other operators in excess of their eligibility on Subscriber Linked Criterion.

b) **Issues to be addressed in the process:**

The most important issue to be addressed would be harmonization of spectrum.

CDMA operators will need to reconfigure their BTS with alternate CDMA frequencies. This is possible through software configuration from the OMCR / OSS platform as a majority of deployed BTSs support configuration of the CDMA frequency within the complete 20 MHz band (870 MHz to 890 MHz).

As per the estimate, reconfiguration will be required for approximately 75 blocks out of 165 blocks presently allocated. A change/ retuning of CDMA TX filters may be required to avoid interference on E-GSM side by restricting their transmission to 879 MHz. The cost of retuning of filters would be negligible as compared to the benefits of unlocking this spectrum from the 800 MHz band.

Further, the guard band of 1 MHz should be provisioned for CDMA and E-GSM network to co-exist. This guard band will ensure minimum requirement of special CDMA filters assuming average of 100m of inter-site distance between CDMA & GSM sites.

c) Process to be adopted for migration:

The following process can be followed for achieving the objectives of harmonization and allocation of EGSM spectrum:

- CDMA operators will need to reconfigure new CDMA allocations in their BTS through OMCR, which is expected to take about 6-9 months across existing infrastructure.
- Upon completion of this reconfiguration, the vacated spectrum from 880 MHz to 890 MHz can be used for deployment of E-GSM networks. This must be done with urgency and within a stipulated time frame.

Q5. Should roll out obligations for new/existing/renewal/quashed licenses be different? Please give justification in support of your answer.

&

Q6. Is there a need to prescribe additional roll-out obligations for a TSP who acquires spectrum in the auction even if it has already fulfilled the prescribed roll-out obligations earlier?

Bharti Airtel's Response:

In our view, rollout obligations need to be different for new/existing/extension/quashed licenses for the following reasons:

- **Rollout obligations for new entrant acquiring startup spectrum in the auction**

  The objectives of roll out obligations are essentially to – a) ensure expansion of networks & services in a specified time within a specified geography b) prevent spectrum hoarding and c) achieve efficient utilization of spectrum. It is, therefore, imperative that new entrants fulfill their rollout obligations on allotment of start-up spectrum. We recommend continuation of the roll out obligations, prescribed during the previous spectrum auctions in November 2012 and March 2013.

- **Rollout obligations for existing telecom operators acquiring incremental spectrum**

  Existing TSPs fulfilled their roll out obligations when they were allocated start up spectrum. These have also been duly tested by the DoT. Hence the existing TSPs should not be subject to any additional rollout obligations upon acquiring incremental spectrum. In this context, it is important to highlight that no additional rollout obligations were imposed on incremental spectrum given administratively in the past. Also, incremental spectrum is only used for capacity enhancement and not for coverage. Therefore coverage related rollout obligations on incremental spectrum are not justified.

- **Rollout obligations for licenses upon extension**

  Currently, the incumbent private operators have more than 83% market share in rural areas and are increasingly covering uncovered areas. Airtel alone has invested thousands of crores in the network and covers more than 85% population and 4.60 lac non census towns and villages. It is, therefore, evident that incumbent TSPs, whose licenses are due for extension, have gone beyond their obligation of fulfilling the mandated roll out obligations. If fresh rollout obligations are imposed on incumbent TSPs, it will only increase administrative hassles and duplicate costs for these TSPs without serving the intended purpose.

Q7. What should be the framework for conversion of existing spectrum holdings into liberalised spectrum?

Bharti Airtel's Response:

a) It is our submission that spectrum held by us is already 'liberalized' / technology neutral. Therefore, we are unable to recommend a framework for conversion of the existing spectrum to 'liberalized' spectrum.

b) The following excerpts from DOT guidelines/press note/ NTP-99/UAS License support our contention that the present spectrum holding is already liberalized :

- "CMSPs shall be free to provide all types of mobile services utilizing any type of network equipment" *(see para 3.1.1 of NTP-99)*

- "CMSPs will be technology wise neutral…be permitted to expand their network using any other technology or GSM technology" *(See DoT's Press Note dated 13.09.1999)*;

- "CMSPs can provide any type of network equipment… that choice of technology is to be left to CMSP's (and has to be digital) " *(See DoT's letter dated 01.10.1999)*;

- "Operators have been permitted to operate the Cellular Mobile Telephone Service in any technology (shall be digital) *(See DoT letter dated 09.04.2001)*;

- The UAS licensing regime lays down that UASL are free to use any technology without any restriction *(See UAS guidelines dated 11.11.2003)*;

- The UAS license provides that any digital technology having been used for a customer base of 1 lakh subscribers for 1 year is permissible for use regardless of its changed versions *(See clause 23.1 of UAS License)*;

- Both DoT and TRAI have stated multiple times that spectrum is already technology neutral i.e. services can be operated in any technology in the given band (i.e.800/900/1800 MHz). Like … present policy on spectrum use is technology neutral *(See para 2.2 of TRAI Consultation Paper dated 31.05.2004)*.

c) We would also like to point out that contrary to the government's stance that spectrum given in bands of 800, 900/1800 MHz is for use in specific technology i.e. CDMA and TDMA (GSM) respectively; dual spectrum operators have been offering **3G EVDO services in the 800 MHz band**. If indeed, it is incumbent under the license that 800 MHz can only be used for CDMA, it is extremely surprising that dual technology operators have been allowed to continue providing EVDO services.

d) Under Clause 43.5(i) the License allows assignment of spectrum up to 4.4+4.4 MHz if the chosen technology is TDMA based systems. In such a case, the channel plan will be 200 KHz per carrier or 30 KHz per carrier. It further states that the type(s) of systems to be deployed are to be indicated for making available appropriate frequency spectrum for rollout of services under the license. The Licensee is free to choose any technology. There is no mention of spectrum band in Clause 43.5(i). In fact, Clause 43.5(ii) simply mentions the designated frequency bands under the license. It is clear from these clauses that there is no restriction on the use of spectrum in 800/900/1800 bands to any specific technology.

e) Currently, more than 500 million consumers are using GSM based mobile services, primarily voice over 900/1800 MHz network across the country. Even though we believe that spectrum is liberalized, it is not realistic or feasible to abandon or change the use of existing spectrum from the current GSM technology in favour of the futuristic UMTS/LTE technology. It is, therefore, incomprehensible how the Authority can seek views to create a framework for liberalization of already 'liberalized' spectrum which in any event, is unlikely to be used for UMTS/LTE technology in the near future.

f) Further, we believe that an erroneous view has been taken by the government that since spectrum in 900/1800 MHz band was given in channel plan of 200 KHz it was not 'liberalised' spectrum. It is our submission that the license does not restrict the usage of spectrum in 900/1800 MHz bands to any specific technology or to any prescribed channel plan. The license is only a mechanism for allotment of spectrum and the decision to deploy any technology lies with the TSP. Since the TSP chose to deploy GSM / CDMA technologies, spectrum was allocated by WPC in the channel plan of 200 KHz/ 1.23MHz. Subsequently, if the TSP intends to deploy some other technologies in the allocated spectrum, the clubbing of channels is not disallowed. Even the CDMA operators that have been allocated spectrum in the channel plan of 1.23MHz have combined allocated channels to deploy 3G EVDO Rev. B services. Even today, while spectrum allocated via auction is being deemed to be 'liberalised', it is allocated in the channel plan of 1.25MHz. A liberalised use will require four such blocks to be clubbed for deployment of new technologies. If four blocks of 1.25MHz can be combined together for liberalised use; by

the same principle, 25 channels of 200 KHz can surely be combined together.

g) It is imperative for the Authority to formulate a consistent and non-discriminatory policy. Accordingly, since CDMA operators have been allowed to continue EVDO services, GSM operators must also be allowed to combine channels and offer 3G/4G services.

In conclusion we request the Authority to allow market forces to determine the price of spectrum which is far more relevant than a framework for already 'liberalized' spectrum.

Q8. Is it right time to permit spectrum trading in India? If yes, what should be the legal, regulatory and technical framework required for trading?

Bharti Airtel's Response:

We strongly believe that spectrum trading should be permitted in India for spectrum that has been assigned through auction.

Spectrum trading will provide flexibility to TSPs requiring more spectrum to purchase it from the market. It will also provide the necessary flexibility to TSPs wanting to exit; resulting in efficient utilization of spectrum. For example, in 2010, the TSPs acquired 3G and BWA spectrum at exorbitant price as the market uptake for these services was perceived to be very high. However, 3G services have not taken off as expected. In case of BWA, only Airtel has launched services – and that too, only in a few circles. Given the tough financial condition of the telecom sector, it has become difficult for some TSPs to rollout their network in 3G or BWA spectrum band even after holding spectrum for almost 3 years. These TSPs can neither sell their 3G/BWA spectrum nor surrender spectrum back to the government without forfeiting the auction price. The present M&A policy does not allow these TSPs to selectively demerge spectrum in a particular band and then sell it to some other TSP.

We recommend the following legal, regulatory and technical framework for spectrum trading:

- Eligibility conditions for spectrum trading and participation in spectrum auction should be the same. This is to ensure that only existing TSPs or serious new entrants can trade spectrum. However, the Authority should frame the rules for trading in a manner which prevents speculation and spectrum hoarding.

- There should be a uniform cap for spectrum holding per circle in case of trading, spectrum auction and merger & acquisition.

- There should not be any spectrum trading charges for the auctioned spectrum as the government has already collected the market value of spectrum.

- The government should not link spectrum trading with fulfillment of the related rollout obligations or with any other condition. There are only two possible scenarios:-

  - In case, spectrum trading takes place before the fulfillment of rollout obligations, then the buyer should be responsible for fulfilling the rollout obligations.
  - If spectrum trading takes place after the mandatory rollout obligations period, but without fulfilling it, then the seller company should be responsible for the consequences, before trading is allowed.

- Definition of the technology to be adopted should be ratified by WPC to ensure that the traded channel plans do not interfere with the adjacent existing spectrum which is already in use.

- Any harmonization request as a result of acquiring non adjacent blocks through trading should be done within a stipulated period.

Alternate approach:

In case, the government decides not to allow spectrum trading, then as a special case, it should allow band wise exit enabling TSPs to sell the entire spectrum in a particular band. This will certainly enable such TSPs to improve efficiency, reduce costs, optimize their balance sheets and focus on providing the remaining telecom services, while retaining flexibility of technology.

Q9. Would it be appropriate to use prices obtained in the auction of 3G spectrum as the basis for the valuation in 2013? In case the prices obtained in the auction of 3G spectrum are to be used as the basis, what qualifications would be necessary?

&

Q11. Is indexation of 2001 prices of 1800 MHz spectrum an appropriate method for valuing spectrum in 2013? If yes, what is the indexation factor that should be used?

Bharti Airtel's Response:

In our view, the value of spectrum should neither be too high which will inevitably result in significant increase in consumer tariffs, unsold spectrum and consequently no revenues for the exchequer; nor should it be too low, which will result in non-serious players hoarding spectrum. The value of spectrum should strike a delicate balance between maximizing revenues for the exchequer while being financially viable for the TSPs.

The value of spectrum, at any particular point of time depends on a large number of factors:

- Demand for services.
- Growth of the ecosystem – handsets, applications and network equipment.

- Stage of the technology in its life cycle for which spectrum is suitable
- Level of competition – number of operators
- Availability of spectrum – demand/ supply
- Per capita income/disposable income –purchasing power of the consumer
- Teledensity/ residual teledensity –addressable consumer base
- ARPU & RPM – usage behaviour

Each of these factors has a significant impact on the valuation of spectrum. It is, therefore, imperative that prices discovered in the past be considered relevant only if the factors mentioned above remain largely unchanged.

1. **<u>3G spectrum as the basis for the valuation of Spectrum in 2013:</u>**

   3G prices should not be used as the basis of valuation of spectrum in 2013 due to the following reasons:

   - **Overestimated perceived demand:** In 2010, the TSPs perceived a high demand for 3G services by the consumer. The industry believed that 3G services had a high revenue potential with a market mature enough for speedy uptake. However, the last few years have revealed that the demand perceived by the TSPs was grossly overestimated and resulted in disproportionate investments being made by existing TSPs for 3G/ BWA spectrum. The TSPs are finding it very difficult to recover these investments, primarily due to the low penetration of 3G enabled handsets, (still as low as around 6-8%, even after 3 years of auction) resulting in very slow adoption of 3G services by the consumers.

   - **Demand Supply Gap:** The supply of 3G spectrum in auction was constrained to only 3-4 blocks per circle as compared the high demand due to the presence of 10-12 TSPs in each circle. This gap became more acute as the existing TSPs were waiting for allocation of additional spectrum in the last few years. Moreover, the Authority also recommended limiting the administrative 2G spectrum as per the prescribed limit i.e. 10 MHz for Delhi / Mumbai and 8 MHz for remaining service areas.

   - **Auction Process:** Flaws in the simultaneous ascending auction process requiring the operator to bid continuously in order to be assured a block of spectrum in a circle led to a steep rise in prices of certain circles.

   The failure of November 2012 and March 2013 auctions where the reserve price was derived basis the final price of 3G spectrum makes it amply clear that 3G spectrum prices were unrealistically high and therefore should not be used to determine the valuation of spectrum in 2013.

   In fact, a study conducted by COAI & PwC in May 2012 stated that consumer tariffs would go up by 26 paisa if TRAI's recommendations of May 2012 were accepted. In June

2012, a similar study of COAI & E&Y also concluded that there will be a significant impact of TRAI's recommended spectrum price on operators' cost per minute and consumer tariffs. (PwC and E&Y report attached as Annexure 3 and 4)

2. <u>Indexation of 2001 prices of 1800 MHz spectrum for valuing spectrum in 2013:</u>

In the past 12 years, a large number of factors determining the valuation of spectrum have changed considerably. Few of these are indicated below:

- Teledensity has increased from 3.5 – 4 % in 2001 to 73% in 2013.
- Level of competition has increased from 2-4 mobile operators in 2001 to 7-9 operators in 2013, resulting in a significant drop in tariffs.
- New technologies such as 3G/4G are being deployed as compared to only 2G networks during the year 2001.
- Network and usage was purely voice/SMS centric during the year 2001.

Therefore, we believe that after so many years it would be incorrect to use the price of spectrum in 2001 to derive a valuation of spectrum in 2013.

Q17. Should the valuation of spectrum and fixing of reserve price in the current exercise be restricted to the unsold LSAs in the 1800 MHz band, or should it apply to all LSAs?

&

Q12. Should the value of spectrum in the areas where spectrum was not sold in the latest auctions of November 2012 and March 2013 be estimated by correlating the sale prices achieved in similar LSAs with known relevant variables? Can multiple regression analysis be used for this purpose?

Bharti Airtel's Response:

During the Auction of November 2012 & March 2013, reserve prices were determined on the basis of the final price of 3G spectrum auctioned in year 2010. Despite the fact that all spectrum released as a result of quashed licenses was not put up for auction and a great degree of artificial scarcity was created, the complete spectrum put to auction could not be sold except for one LSA. It is fair to assert that the exorbitantly high reserve price led to the failure of these two auctions.

A majority of spectrum sold during November 2012 and March 2013 was a result of "**distress buying"** for continuity of services and adjustment of entry fee by those operators whose licenses were cancelled by the orders of Hon'ble Supreme Court of India.

In this context, we believe that the prices discovered through the "distress buying" in November 2012 and March 2013 cannot be termed as the market discovered prices even for

those 18 LSAs where spectrum was sold. Therefore, they should not be used as a reference for estimating the value of spectrum in the remaining 4 circles. We would earnestly request the Authority to recalibrate the valuation of spectrum for all LSAs afresh after taking into consideration the present market/economic realities.

Q10. Should the value of spectrum for individual LSA be derived in a top-down manner starting with pan-India valuation or should valuation of spectrum for each LSA be done individually?

Bharti Airtel's Response:

Each circle/ LSA represents a unique business case depending upon the following:

- Perceived demand for services
- Level of competition – number of operators
- Availability of Spectrum – demand/ supply
- Per capita income/disposable income – purchasing power of the consumer
- Teledensity/ residual teledensity – addressable consumer base
- ARPU & RPM – usage behavior
- Infrastructure & power availability
- Geographical area – dense urban, urban, sub-urban & rural area
- Urban and rural population
- Population density
- Literacy rate

Since these factors vary widely from one LSA to another, the value of spectrum cannot be the same for all the circles or a group of circles. Therefore, we propose a bottom up approach to determine the value of spectrum.

Hence, in our view, value of spectrum should be derived for each LSA individually.

Q13. Should the value of spectrum be assessed on the basis of producer surplus on account of additional spectrum? Please support your response with justification. If you are in favour of this method, please furnish the calculation and relevant data along with results.

Bharti Airtel's Response:

No, we don't agree with the methodology of deriving the value of spectrum using the producer surplus method.

It is a fundamental economic principle for any industry that the greater the size and scale, the greater the efficiency. Therefore applying the method of producer surplus:

- Penalizes the serious operators with efficient operations dues to economies of scale, productivity and / or operating efficiencies.

- Strikes at the core philosophy of deriving efficiencies in operation, thereby dis-incentivizing the TSPs from becoming more productive / efficient since the "State" will appropriate all such efficiencies as part of spectrum valuation.

Moreover, the producer surplus method also suffers from following shortcomings:

- Various TSPs utilize spectrum in different ways, and as a result the efficiency of spectrum utilization varies from one TSP to another. When the producer surplus method is used to arrive at a value of spectrum, it leads to erroneous results which cannot be applied uniformly to all TSPs.

- Factors such as revenue earning potential, the different technologies available, availability of ecosystem in respect of technology and incumbency are not considered by this approach, making it unsuitable for assessing the value of spectrum.

- When a new TSP enters the market, it has the freedom to use its resources/ spectrum to employ the latest technology whereas the existing TSPs are tied in to their existing technology due to the network deployed and existing consumers using that technology.

- Various TSPs may use spectrum for different technology whereas this approach would assume a single technology and therefore is not realistic.

- Finally, the producer surplus will be different for different TSPs depending on their capacity expansion forecasts and existing footprint. Hence, any result basis these calculations cannot be applied uniformly to all TSPs.

As deliberated above, using the producer surplus methodology on spectrum valuation has many inherent drawbacks that make it unsuitable in deriving the value of spectrum.

Q14. Should the value of spectrum in the 1800 MHz band be derived by estimating a production function on the assumption that spectrum and BTS are substitutable resources? Please support your response with justification. If you are in favour of this method, please furnish the calculation and relevant data along with results.

Bharti Airtel's Response:

The production/ substitution model proposed by the Authority is based on the premise that the end product i.e. the produced MOUs is based on two factors that are mutually substitutable – i.e. the number of BTSs and the quantum of spectrum. Therefore, the value of spectrum can be determined by the cost of equivalent quantity of BTS.

It is worth noting that typically, the Cobb-Douglas production function is used in manufacturing industry wherein:

- There is no supply constraint
- Man and machine are fully substitutable
- Input prices i.e. prices of man and machine are constant
- Goods produced can be stored to meet the demand at a later date/ time (e.g. production can be done at night for meeting the demand in the day time)

It is our submission that using this production function to estimate the value of spectrum by correlating it to the cost of equivalent quantity of BTSs is totally erroneous for the following reasons:

a) Firstly, the BTS and Spectrum are not fully substitutable in a mobile network due to the following major reasons:
   - **Interference issues:** In all the new spread spectrum technologies the network is interference limited and hence the density of base stations cannot be increased beyond a point
   - **Spectrum is a scare and finite resource:** One of the inputs i.e. spectrum is finite and in limited supply so there cannot be infinite substitution of spectrum with BTS or vice versa. Spectrum is not tangible i.e. neither is it available whenever required nor can it be 'dispensed' with when the demand falls since it has been paid for, upfront, for the next 20 years.
   - **Associated intangible costs:** There cannot be an enormous/ infinite increase in number of BTSs in lieu of spectrum as there are other associated intangible costs like the costs to the environment, radiation impact etc.
   - **Site acquisition:** The efforts and the cost of getting sites in cities cannot be undermined to which there can be no real substitution.

b) Secondly, the price of input i.e. spectrum can vary over a period of time

c) Thirdly, the demand in telecom networks is to be met instantaneously. The network is designed basis peak load and the minutes unutilized at any moment of time cannot be stored and used at a later stage.

d) Fourth, the Cobb-Douglas production function does not adequately capture the different stages of network growth. These stages are described below:-

   Stage 1 – New network deployment for providing coverage
   - There is no substitution between the number of BTSs and spectrum at this stage of the network since a new TSP deploys network to provide coverage and not for capacity.
   - The number of BTSs are fixed and coverage can be provided with minimal number of transceivers and minimal spectrum

Stage 2 – Utilizing the capacity of initial BTSs

- In this stage there can be no substitution between BTS and spectrum as both are fixed - the capacity of the initially deployed BTSs is simply utilized to meet the demand.

Stage 3 – Expanding the capacity of network:

- Expansion may happen in two ways – additional BTS or more spectrum
- More spectrum will allow the TSP to install more transceivers in existing BTSs thereby increasing capacity. Capacity is somewhat proportional to the number of transceivers because of scale economies of trunking.

Stage 4 – Interference limited network:

- The network is so congested that it is difficult for TSPs to construct new BTSs without causing radio interference.
- Only additional spectrum can create additional capacity as the number of BTSs cannot be increased.

e) Last but not the least; different TSPs may deploy different technologies. The Cobb-Douglas approach does not account for change in technology.

We therefore are of the view that the value of spectrum should not be estimated using a production function.

Q15. Apart from the approaches discussed in the foregoing section, is there an alternate approach for valuation of spectrum that you would suggest? Please support your answer with detailed data and methodology.

Bharti Airtel's response:

Spectrum valuation is a function of multiple factors and is only relevant for the period in which the auction is taking place. The economic, technological and competitive factors involved in securing spectrum through an auction or tender, change radically across a given period.

In April 2012, the Authority recommended an exorbitant reserve price of Rs.18,111 Crs. for 5MHz in 1800 MHz band. For 800/900 MHz, the reserve price was set at 2x of the 1800 MHz reserve price. However, before the November 2012 auction, the government reduced the reserve price of 1800 MHz by 23% to Rs.14,000 Crs. Also, at the Authority's recommendations, the reserve price of 800 MHz was kept at 1.3 times the reserve price of 1800 MHz band, i.e. Rs.18,200 Crs.

However, despite the fact that the reserve price of spectrum was reduced to this extent, the government failed to sell all spectrum blocks put to the auction. While no spectrum was sold in 800 MHz band; for the 1800 MHz band, a majority of spectrum sale was a result of 'distress buying' by TSPs whose licences had been quashed. They bought this spectrum to

ensure continuity of services to their consumers and in an attempt to adjust the non refundable entry fee. In four circles namely Delhi, Mumbai, Karnataka and Rajasthan, no spectrum was sold in 1800 MHz band.

Thereafter for the March 2013 auction, the government further reduced the reserve price of 1800 MHz band for four circles by 30%. For 900 MHz band, the reserve price was set at 2x of the reserve price of 1800 MHz. For 800 MHz band, the reserve price was reduced by 50% across all circles. However, no operator acquired spectrum in 900 MHz and 1800 MHz despite this reduction and only one TSP whose license had been quashed acquired spectrum in 800 MHz band for eight circles.

The results of the last two spectrum auctions show that the above reductions were not sufficient to attract investors. The valuation of spectrum needs to be done keeping these failed auctions in mind and should ideally result in a significant reduction in the auction prices over November 2012 and March 2013. The reduced price should be independently corroborated by a separate valuation exercise on the basis of discounted cash flow at an industry level for each LSA.

Q16. Should the premium to be paid for the 900 MHz and liberalised 800 MHZ spectrum be based on the additional CAPEX and OPEX that would be incurred on a shift from these bands to the 1800 MHz band?

Bharti Airtel's response:

The coverage efficiency of sub 1 GHz frequencies has a tangible advantage over 1800 MHz because of its propagation characteristics. This is especially important from a penetration loss perspective, where indoor coverage is critical for quality of service.

However, most networks in metros/urban areas are getting capacity limited where inter site distance for both 900 MHz & 1800 MHz spectrum is similar. Therefore the network costs in these cities are determined by the number of sites deployed for capacity requirements. In this case the coverage efficiency and service quality advantage of 900 MHz over 1800 MHz is not significant.

In non-metro circles, rural sites account for 40-50% of the total sites where 900 MHz has an advantage over 1800 MHz.

In summary, we believe that the advantage towards better coverage and quality of service will justify a premium in the valuation of 800/900 MHz spectrum over 1800 MHz. Based on the total cost of ownership the ratio of 800/900 MHz over 1800 MHz should be **1.2**. However this ratio will vary depending on the absolute value of 1800 MHz.

Q18.

a) **Should annual spectrum usage charges be a percentage of AGR or is there a need to adopt some other method for levying spectrum usage charges? If another method is suggested, all details may be furnished.**
b) **In case annual spectrum usage charges are levied as a percentage of AGR, should annual spectrum charges escalate with the amount of spectrum holding, as at present, or should a fixed percentage of AGR be applicable?**
c) **If your response favours a flat percentage of AGR, what should that percentage be?**

Bharti Airtel's Response:

The guiding principles governing Spectrum Usage Charge must ensure that the total cost of spectrum is equitable for all TSPs across the entire period of the license.

The present method of levying escalating spectrum usage charges was relevant when spectrum was allocated administratively on the basis of Subscriber Linked Criteria and no upfront charges were required to be paid for incremental spectrum.

It is important to make a reference to the press release dated 31st October 2008 wherein DOT has stated that "*In case spectrum is auctioned, it would not have been possible to charge the higher spectrum usage charges of the order of 2-6% and maintenance and administration cost which is typically of the order of 0.5% to 1% could be recovered in a judicial manner*". Thereby, DoT has also acknowledged that escalating spectrum usage charge was just a substitute for an upfront/onetime fee. There was never any intent to continue with both the charges i.e. an upfront fee as well as an escalating spectrum usage charge.

Further, wherever spectrum is sold globally, against an upfront price determined through auction, the spectrum usage charge is always kept at a nominal/minimal level so as to recover the cost of spectrum management and administration.

In light of the above, in our view, the annual spectrum usage charge for the auctioned spectrum should be uniform @ 1% of Adjusted Gross Revenue.

The above proposal will ensure a non discriminatory framework while also ensuring overall revenue for the exchequer in the long term. Moreover, it will effectively address the prevailing anomalies in the present regime of escalating spectrum usage charge which has been rightly acknowledged. Some examples of this discrimination are as under:

- TSPs who hold 2G spectrum in 900 MHz & 1800 MHz (GSM operators) pay higher spectrum usage charge based on their combined spectrum holdings in 900 MHz and 1800 MHz band as compared to the dual technology operators who hold spectrum in 1800 MHz and 800 MHz. This is because the latter pay spectrum usage charges for 1800 MHz & 800 MHz separately as a share of segregated revenues from two independent spectrum bands which typically works out to a lower amount.

- In the new regime where spectrum is being sold against the upfront charges determined through the auction, a higher and escalating spectrum usage charge leads to a wide variation in the total cost of spectrum, paid over the period of the license by existing TSPs in comparison to new TSPs. For example, while two operators would pay the same upfront charges for spectrum procured through auction, a new entrant will pay the spectrum usage charge at the lowest slab i.e. 3% of AGR and an existing TSP would pay at a higher slab on the basis of its total spectrum holding in 2G band.

- The discrimination on account of escalating spectrum usage charge is further perpetuated by adding the quantum of spectrum procured through auction in the administrative spectrum holding which is used to determine the slab of spectrum usage charge.

The table below compares the difference in total cost of ownership of spectrum between new and existing TSP on account of spectrum usage charge:

S No	Charges	New TSP	Existing TSP
A	Upfront charges determined through auction	**Same**	**Same**
B	Additional Spectrum Usage Charges **on "existing revenues" from the existing spectrum**	**Nil** as the new TSP has no existing AGR	**1**% of existing AGR in case the TSP is allocated 1 block of 1.25 MHz **2**% of existing AGR in case the TSP is allocated 2 blocks of 1.25 MHz
C	Spectrum Usage Charge on **"new revenues" from Spectrum allocated via auction**	**3-4**%	**5-8**%

In light of the above, we sincerely hope that the Authority will correct the discrepancies in the current practice of levying spectrum usage charge and consider our proposal which is aimed at ensuring a level playing field as well as long term benefits to the exchequer.

Q19. What should be the ratio adopted between the reserve price for the auction and the valuation of the spectrum?

Bharti Airtel's Response:

The Authority has rightly recognized the distinction between the estimated market price vs. reserve price. We agree with the Authority's view that the reserve price should be set at an

optimum level. It should not be too high which may result in TSPs being deterred from participation and therefore in unsold spectrum and the resultant inefficiency. Nor should it be too low which may result in collusive behavior or the entry of non-serious players in the auction. The advantage of an optimal reserve price is that it encourages participation significantly whereas the competitive auction process and hubris drives up the market prices during the auction.

Table 4.2 of the consultation paper shows international benchmarks on reserve price which have a mean value of 0.45 and a median of 0.4173 for the ratio of reserve price to the final price. We concur with these numbers and suggest the Authority keep the Reserve Price at 0.45(45%) of the estimated value of spectrum. This will allow the TSPs to freely and fairly exercise their options.

Any premium attached with any spectrum band will have higher demand and attract higher auction price, therefore, it is proposed that the reserve price of all spectrum bands, i.e. 800, 900 and 1800MHz should be kept uniform.

Annexure – 1

International instances of Re-distribution

Market	Spectrum holdings before Re-distribution	Spectrum holdings after Re-distribution
Sweden	Tele2: 10 MHz Telenor: 10 MHz TeliaSonera: 10 MHz Swefour: 5 MHz	Tele2: 7.5 MHz *(25% reduction)* Telenor: 7.5 MHz *(25% reduction)* TeliaSonera: 10 MHz Swefour: 5 MHz Hi3G: 5 MHz
France	Bouygues Telecom: 9.8 MHz Orange France: 12.4 MHz SFR: 12.4 MHz	Bouygues Telecom 9.8MHz Orange France 10 MHz *(20% reduction)* SFR 10 MHz *(20% reduction)* Free Mobile 5 MHz
Sri Lanka	Celltel 13.0 MHz MTN Networks 7.5 MHz Hutchison 10.5 MHz	Celltel 7.5 MHz *(35% reduction)* MTN Networks 7.5 MHz Hutchison 7.5 MHz *(29% reduction)* MobiTel 7.5 MHz
Denmark	Telia 14.8MHz TDC Mobil 9 MHz Telenor 9 MHz	Telia 11.8 MHz *(20% reduction)* TDC Mobil 9 MHz Telenor 9 MHz Hi3G 5 MHz

Annexure-2

S. No.	EGSM Band assigned to GSM operators
1	Albania
2	Lithuania
3	Luxembourg
4	Austria
5	former Yugoslav Republic of Macedonia
6	Belgium
7	Montenegro
8	Bulgaria
9	Netherlands
10	Croatia
11	Norway
12	Czech Republic
13	Denmark
14	Romania
15	Estonia
16	Russian Federation
17	Finland
18	France
19	Slovak Republic
20	Georgia
21	Slovenia
22	Germany
23	Spain
24	Sweden
25	Switzerland
26	Iceland
27	Ukraine
28	Italy
29	United Kingdom
30	Latvia
31	Liectenstein
32	Sri Lanka
33	Bangladesh

Impact of TRAI's spectrum recommendations on consumers and industry

PwC Assessment of TRAI Recommendations

May 2012

pwc

Contents

Executive Summary

The draft NTP 2011 emphasises the role of telecoms in "accelerated equitable and inclusive economic growth by laying special emphasis on providing affordable and quality telecommunication services.." In light of these aspirations we assess TRAI's 'Recommendations on Auction of Spectrum' published on 23rd April 2012, in particular because TRAI discusses consumer impact and we wish to understand the possible effects on tariffs and on the telecoms industry. This study has been commissioned by Cellular Operators Association of India.

TRAI's computed cost increase per minute at a national level is 4.4 paisa per minute (for 2013). However, due to numerous considerations we have found that the impact on cost per minute is likely to be far greater, in a range between 24 paisa and 28 paisa per minute. The impact in Metros would be even more prominent, with cost per minute increasing by 90 paisa. We have also found that operators are unlikely to have further capacity to absorb such cost increases and that therefore we may see significant tariff increases.

In this paper we focus on four topics concerning the spectrum auction recommendation:

- assess the quantum of subscriber cost impact of TRAI's recommendations and recalculate accordingly
- discuss wider considerations which must be taken into account to gain a full and fair view of the likely cost impacts
- look at the likely effects on the telecom industry's financial performance focusing on the implications of a heavier debt burden and already declining operator margins
- estimate the range of tariff increases that operators may be forced to make in order to service additional financing of spectrum.

The quantum of cost impact of the TRAI recommendations

TRAI's workings omit three considerations based on applying common economic principles of regulation in arriving at incremental cost per minute for a subscriber:

- TRAI underestimates the cost per minute impact by around 50% by counting both incoming and outgoing MOU in its calculations rather than just the outgoing MOU which are charged
- TRAI does not consider the further cost of extension of licenses for renewed usage of spectrum which are at present in use for servicing current customer needs

TRAI omits the additional spectrum that will be required to service the huge growth in voice and data traffic implied by TRAI's workings, which estimate MOU growth of 2.58 X over the 20 year period we have recalculated TRAI's cost estimates per subscriber to reflect the three issues above. On the third issue, we note that the workings assume voice and data growth but no spectrum growth and therefore underestimate the full spectrum cost per minute to the subscriber. To be consistent, we have calculated the cost per minute impact from the spectrum being auctioned now by holding today's traffic levels constant through the 20 year period.

An overview of this recalculation to TRAI's estimates in Annexure 7 of its document

PwC assessment of Cost of spectrum (paisa): selected years 2011-2032	FY13	FY19	FY25	FY31
TRAI estimate on cost per minute	**4.4**	**2.8**	**2.2**	**1.8**
Impact of holding MOU constant, due to additional spectrum non-availability (refer section 1.3)[1]	0.0	1.5	2.3	2.7
Impact due to license extension of existing spectrum (refer section 1.1)[2]	8.2	8.2	8.2	8.2
Adjusting for calculating impact on chargeable (outgoing) MOU **only (refer section 1.2)**[3]	13.4	13.3	13.6	13.6
Estimated cost per minute (refer table 10)	**26.1**	**25.9**	**26.4**	**26.3**

Source: Recommendations on Auction of Spectrum, TRAI; PwC analysis

Note:
1. To be consistent, we have recalibrated TRAI's cost estimates per subscriber by holding today's traffic levels constant going forwards through the 20 year period, so that the traffic consideration is more in line with the spectrum being costed for carrying it.
2. The workings only factor 576.2 MHz of spectrum to service the MOUs and omit the cost of license extension of usage of already allocated spectrum that would continue to be required to service the current level of MOU
3. The total MOU figures used are a sum of both the incoming and outgoing minutes. However, since subscribers are charged only for outgoing minutes, the per minute cost impact should be computed based on outgoing minutes so that it may be more readily compared to potential tariff changes
4. Computation explained after Table 10.

Wider considerations which would have a further cost impact

There are further considerations with respect to cost impacts which we note below but have not factored into the PwC recalculations. All of these points have a bearing on the TRAI workings, would make the cost impact higher, and question the consistency of the workings with established market paradigms in India and other markets:

- In its operator estimate (Annexure 8) MOU per subscriber is assumed by TRAI to grow by 83% in the 20 year period, while in the last four years MOU per subscriber has declined by 13% per annum
- Price increase as a result of cost rises as set out by TRAI could result in lower usage, not higher usage as TRAI forecasts
- TRAI predicts rapid voice usage growth, and even faster data usage growth. This contradicts international experience, where data usually grows at the expense of voice growth
- India is unlikely to see data usage as 50% of revenue by 2020-21 as estimated by TRAI, and would also require a significant increase in spectrum to carry the additional traffic

Impact on operators' financial performance

Whilst Indian mobile operators have absorbed cost increases in the past, including after the 3G auctions of 2010, due to the erosion of margins in the past few years we do not believe the industry has the capability to do so further due to the following findings:

- operators' PAT margins have been falling for several years and have reached single digits or negative across all bar one of the reporting operators by 2012
- Indian telecom operators' average EBITDA margins are now by some way the lowest in Emerging Asia, standing at 28.9% compared to a regional average of 40.0%
- operators' debt service burden will become too heavy; this is usually indicated by Total Debt/EBITDA rising to above 3.0 and we expect operators' Debt/EBITDA ratio alone to rise to 7.4 by 2016

Range of expected tariff impacts on Indian consumers

It is likely that operators will be forced to impose tariff increases as a result of the cost increases. We have calculated the tariff impact from a simple pass-through of the cost to the operator, and this results in a tariff increase in the range of 29 to 34 paisa, reflecting the extra spectrum costs plus added impacts of licence fees, taxes and levies.

PwC approach

We have assessed the results contained in Annexure 7 of the TRAI document based on:

- Understanding and validating TRAI's workings and assumptions
- Recalculating results where necessary to remove inconsistencies
- Applying historic, current and forecast market indicators from India and elsewhere

The table below provides a comprehensive view of aspects assessed by PwC. Note that all impacts are calculated on a standalone basis.

Table 1: TRAI Assumptions and PwC Observations

TRAI Assumptions (Annexure 7)	Assessed by PwC
Projected growth in minutes of usage (MOU)	Analyzed the MOU growth assumption basis the following: 1. Treatment of incoming and outgoing MOU 2. Basis of TRAI's estimates for MOU growth 3. How TRAI may have approached MOU per subscriber based on past data
Total projected MOUs	1. Reviewed base number for FY2012-13 2. Validated calculations for subsequent years based on MOU growth cost assumptions (2012-13 to 2031-32)
Auction Fee (Spectrum Cost)	1. Reviewed assumption on quantum of spectrum 2. Validated the computation of the total auction fee
Annualized EMI for Auction Fee	Reviewed computation
Annualized EMI per MOU	Reviewed computation
EMI per minute amortized from revenue from non-voice services	1. Reviewed computation 2. Validated assumption on growth of non-voice revenues based on past and global data
EMI per minute amortized from revenue from voice services	Reviewed computation

Our findings

1. Quantum of impact

Projected growth in MOU & total projected MOU

TRAI has assumed that the total MOU of the Indian telecom market (GSM only) will increase from 3,40,260 Crore minutes in 2012-13 to 8,80, 566 Crore minutes in 2031-32 (refer Annexure 7 of TRAI recommendations). This is an increase of 2.58x the current level over the 20 year time period (refer Table 2).

Cost of spectrum underestimated

Further, the cost for the spectrum has been calculated based on proposed reserve prices for the 1800 MHz band. However, the quantum of spectrum required to service the current volumes would not be fully available in the 1800 MHz band. The total quantum of spectrum would need to be assigned in both 900 MHz and 1800 MHz band. Accordingly, the price for both 900 MHz and 1800 MHz will need to be accounted for.

Table 2: Calculation of increase in MOU

Year	2012-13	2031-32	Ratio
Total MOU (million minutes per year)	3,402,600	8,808,560	2.58
MOU (minutes per month per subscriber)	328	602	1.83
Subscriber (GSM) in mn*	865	1219	1.40

Source: TRAI, PwC analysis. Total MOUs are as per TRAI document. The GSM subscribers are projected using rate of growth of subscribers used by TRAI in Annexure 8.

We have the following observations on the key assumptions on account of the following:

1.1 Cost of license extension of existing spectrum omitted

Spectrum requirement understated

The workings only factor 576.2 MHz of spectrum to service the MOUs and omit the cost of license extension of usage of already allocated spectrum that would continue to be required to service the current level of MOU needs to be taken into consideration. Our recalculations address the additional costs of these license extensions.

Assuming that all reallocation and license extension of spectrum is at the proposed reserve price the total outflow for cost of the spectrum would be approximately Rs 651,000 Crores over the next 20 years as compared to Rs 93,672 crores as per the TRAI calculation (refer Table 11) which is based on the 576.2 MHz of spectrum currently proposed to be auctioned only. The cost per minute increase after taking into consideration the cost of license extension (at present value) would be nearly 2.87x the TRAI estimate (refer table 10)

1.2 TRAI underestimates by more than 50% the possible consumer cost impact by counting both incoming and outgoing MOU , rather than just outgoing MOU

The total MOU figures used are a sum of both the incoming and outgoing minutes. However, since subscribers are charged only for outgoing minutes, the per minute cost impact should be computed based on outgoing minutes so that it may be more readily compared to potential tariff changes. Accordingly, the effective cost impact will be more than double TRAI's estimate as only 48% of the minutes of the total MOUs are outgoing minutes (refer Table 3).

Table 3: Components of Total MOU

MOU (Incoming and Outgoing) - GSM (Minute per month)	Dec 2011
Incoming (minutes per month per subscriber)	171
Outgoing (minutes per month per subscriber)	161
Total (minutes per month per subscriber)	332

Source: TRAI-" Indian Telecom Services Performance Indicator Report" for the Quarter ending December 2011.

The incremental impact on cost per minute would therefore be 13.4 paisa per minute for FY 2012-13 (refer Table 10 for computation explanation).

1.3 TRAI estimates ignore the need for more spectrum to satisfy growth in voice and data traffic

TRAI forecasts a 2.58x growth of MOU over the 20 year period yet does not refer to any plans to increase the quantum of spectrum available to operators to carry this traffic. This renders the outlook on voice and data growth incompatible with the spectrum allocation covered in the TRAI recommendations, and therefore significantly underestimates the spectrum cost per minute to the subscriber. Data from the Wireless Planning Commission indicates that operators already have limited capacity to carry more traffic: there is 353.6 MHz of spectrum applications outstanding today, of which 171.0 MHz is for spectrum in Metros and Circle A.(refer table 4 and table 13).

Table 4: Outstanding applications for spectrum by circle categories (Nov 2011)

Category	MHz
Metro and Circle A	**171.0**
Circle B	124.8
Circle C	57.8
Total	**353.6**

Source: WPC, November 2011

To be consistent, we have recalibrated TRAI's cost estimates per subscriber by holding today's traffic levels constant going forwards through the 20 year period, so that the traffic consideration is more in line with the spectrum being costed for carrying it.

1.4 Cost impacts at a national level do not reflect circle reality- impacts on metros / Circle A subscribers may be significantly higher

The workings have been done at a national level and accordingly do not sufficiently reflect the differences that would be seen at the circle level. The incremental cost per minute on account of the proposed changes would vary across circles on account of differential spectrum cost and volume of minutes, as indicated in Table 5 which shows the Circle type and Metro level impact in contrast to the average impact.

Table 5: Impact of proposed spectrum fee by category of circles

Category of Circle	MOUs (Crores)	Spectrum Cost (Crores)	EMI per year	EMI (impact per MOU (Rs) (Outgoing + Incoming)	EMI Impact per MOU (Rs) (Outgoing only)	Ratio to average impact
Metros	417,10	113,557	18,142	0.46	0.90	344%
Circle A	119059	118,110	18,869	0.16	0.38	125%
Circle B	126559	32,541	5,180	0.04	0.08	32%
Circle C	52932	5,254	839	0.02	0.03	13%
Total	**340,260**	**269,341**	**43,030**	**0.13**	**0.26**	100%

Source: TRAI, PwC analysis

Metro subscribers will experience the most substantial tariff increase, up to 90 paisa per minute, compared to other subscribers because the current spectrum reserve prices are almost 20x times higher than Circle C reserve prices. TRAI's analysis is shown as national averages, and this masks the significant differences between geographies.

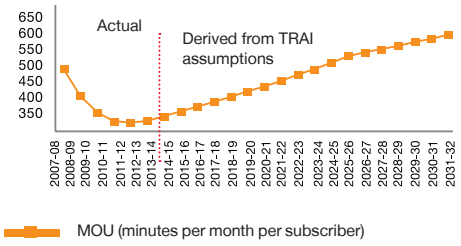
2. Additional considerations

There are further considerations with respect to cost impacts which we detail below but have not factored into the PwC recalculations. All of these points have a bearing on the TRAI workings, would make the cost impact higher, and question the consistency of the workings with established market paradigms in India and other markets.

2.1 MOU per subscriber is assumed to grow by 83% in the 20 year period while in the last four years MOU per subscriber has declined by 13% per annum

TRAI's Annexure 8 assumes that number of subscribers for a typical operator would grow by 40% between FY 2012-13 and FY 2031-32, while the total MOU would increase by 258% during the same period. By calculation this implies that MOU per subscriber increases by 83%. This is not in line with current trends wherein there has been a year on year reduction in MOU per subscriber between 2008 and 2011 (Refer Chart 1). Such MOU increases are inconceivable based on India's already high MOU and past trend.

Chart 1: Historical MOU (2007-2011) and estimated MOU (2012-32)



Source: TRAI, PwC analysis

2.2 Price increases as a result of forecast cost rises as set out by TRAI could result in lower usage, not higher usage as TRAI forecasts

In context of the established precedents RPM increases are associated with decline in MOU per subscriber due to price elasticity of demand on an individual customer basis. Data from the recent past reflects the demand elasticity clearly. For instance, a 2% increase in call costs across the industry in Q2, 2011 resulted in a decline of 1.45% in the MOU per subscriber between Q1 to Q2, 2011.

2.3 TRAI predicts rapid voice usage growth, and even faster data usage growth. This contradicts international experience, where data usually grows at the expense of voice growth

TRAI assumes that data revenue as a percentage of total revenue will grow to reach 50% by FY 2020-21. Such data growth is inconsistent with simultaneous rapid voice growth. For instance in the US and France (refer Table 6), where data contributes 33.2% and 25.7% of the mobile industry revenue respectively, minutes of use have fallen by 3.20% and 2.30% respectively in 2009-10.

Table 6: Comparison of change in data usage with change in MOU (2010)

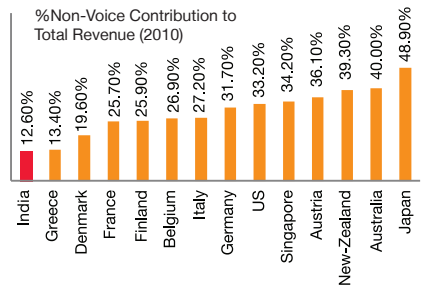
Country	GDP per Capita ($)	MOU - (Min.) YoY	Data % - (US$) YoY of ARPU	Average Spectrum per operator (MHz)	Spectrum Assigned for commercial wireless use	Potentially usable spectrum/ in pipeline	New spectrum to be allocated as % of current
Japan	40,281	-1.20%	48.9%	87	347	400	115.27%
US	33,790	-3.20%	33.2%	82	409.5	50	12.21%
Canada	36,058	-5.40%	25.4%	54	270	200	74.07%
France	39,658	-2.30%	25.7%	125	375	250	66.67%
South Korea	45,416	-2.50%	21.7%	90	270	120	44.44%
Spain	35,245	-1.10%	19.0%	90	415	270	65.06%

Source: BoFA ML Wireless Matrix Q1 2011, Plum consulting,blog.ctia.org/2011/07/26/spectrum-availability-for-wireless-how-do-we-compare/

2.4 India is unlikely to see data usage as 50% of revenue by 2020

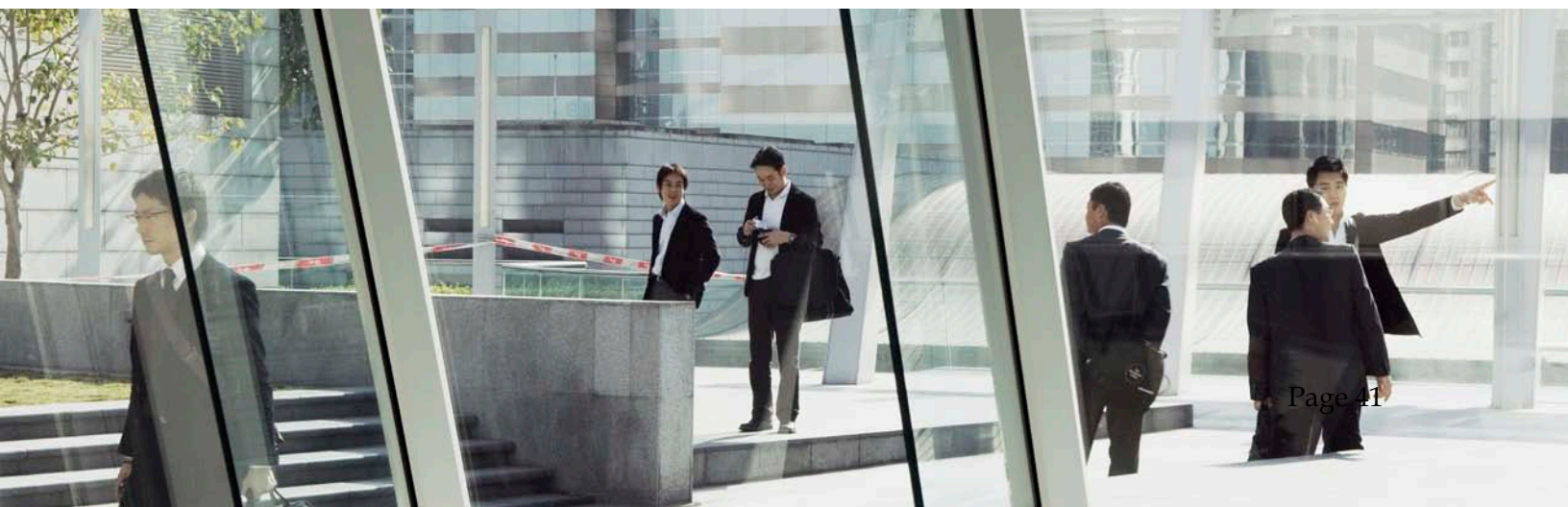
TRAI assumes share of non-voice services as a percentage of revenue for 2012-13 at 18% and forecasts them growing to 50% in 2020-21. At present in 2011-12 the non-voice revenues as a percentage of total revenues is only 14%. Of the 14%, message based services contribute about 9% and non-message i.e. pure data services contribute nearly 5%. It is highly unlikely that data usage revenues will grow from current levels of around 14% to 50% as assumed in the calculations. Even in mature telecom markets such as Denmark, Italy and US the contribution of data services to the revenue was only 19.6%, 27.2% & 33.20% respectively (refer Chart 2) in 2010. In fact, not even Japan has 50% data revenues as a proportion of total revenues today.

Chart 2: Non-Voice Contribution to Total Revenue by Country



Source: BofA ML Wireless Matrix Q1 2011

Global experience in the past few years has shown that mobile operators' costs are rising faster than revenue. Recent analysis undertaken in the North America market shows that the cost of data may fall from $20/Gb in 2010 to $7 in 2015, whereas revenue per user may fall from $25/Gb to only $5 (source Arlington Economics, LLC).



3. Implications on operators' financial performance

Whilst in some cases operators have been known to absorb cost increases without passing them on to customers in the form of price rises, the key determinant is the financial health of the operators. Since 2008, with the entry of additional operators in the Indian mobile market, and rapid per minute price declines, operator margins have been declining rapidly. This has been compounded by the additional cost burdens of 3G roll out since 2010. Examining the factors below we therefore expect the industry's financial health and sustainability to be undermined further by the impact of the spectrum recommendations.

Declining operator returns

The decline in operator financial performance has been significant since 2007, as shown in Table 7 which shows how PAT margins have declined to single figures for all bar one of the reporting operators from 2007 to 2012, to negative in some cases.

Table 7: PAT Margins of selected Operators, FY 2007-FY 2012

	FY2007	FY2008	FY2009	FY2010	FY2011	FY2012
Vodafone	17%	11%	0%	-3%	0.01%	NA
Idea Cellular	11%	15%	9%	8%	4%	4%
Aircel	35%	9%	-8%	-66%	-42%	NA
Reliance	22%	29%	27%	22%	7%	5%
Bharti	23%	25%	24%	26%	20%	14%
TTSL	-46%	-35%	-33%	-21%	-41%	NA
TTML	-22%	-7%	-8%	-14%	4%	-21%
Shyam Sistema	-53%	-158%	-620%	-616%	-310%	NA
HFCL Infotel	-42%	-57%	-96%	-11%	-93%	NA
MTNL	14%	12%	4%	-68%	-71%	-101%
BSNL	20%	8%	2%	-6%	-22%	NA

Source: Annual Filings of Operators with the Registrar of Companies, Capitaline, India Infoline,Company Websites. Reliance and MTNL FY 12 figures are based on 3 quarters.

Indian telecoms has the lowest average EBITDA margins amongst emerging Asia countries, with the average EBITDA margin in India dropping from 39.4% in 2006 to 28.9% in 2012. This industry average masks far lower margins of some operators during this period.

Table 8: Emerging Asia Telecoms EBITDA margins (2004 to 2012)

(%)	2004	2005	2006	2007	2008	2009	2010	2011	2012
Emerging Asia	47.50%	47.80%	46.90%	45.70%	43.90%	42.80%	42.10%	35.90%	36.10%
Bangladesh	47.30%	25.20%	39.70%	27.90%	32.80%	48.70%	41.90%	47.30%	47.10%
China	50.60%	50.10%	50.00%	50.70%	48.50%	45.40%	42.80%	40.90%	40.90%
India	**33.30%**	**35.70%**	**39.40%**	**38.40%**	**33.80%**	**32.30%**	**29.50%**	**28.20%**	**28.90%**
Indonesia	67.60%	66.20%	63.00%	57.80%	59.00%	55.30%	54.30%	53.20%	54.20%
Korea	37.30%	39.30%	36.40%	31.30%	30.10%	31.90%	31.80%	32.00%	33.20%
Malaysia	49.40%	52.70%	49.50%	48.40%	48.10%	46.60%	47.50%	47.10%	46.60%
Pakistan	48.70%	30.40%	29.40%	36.00%	32.10%	31.90%	34.60%	36.70%	37.60%
Philippines	63.70%	63.60%	64.90%	65.60%	64.80%	63.00%	62.90%	61.80%	62.00%
Thailand	54.00%	49.00%	44.70%	36.70%	37.30%	38.70%	41.60%	42.30%	41.50%

Source: Bank of America Merrill Lynch Wireless Matrix (4Q 2011)

Unsustainable Industry Debts

The debt burden of the Indian telecoms industry has increased significantly since 2009 to reach at Rs 185,720 Cr as on March 2012. (refer table 9)

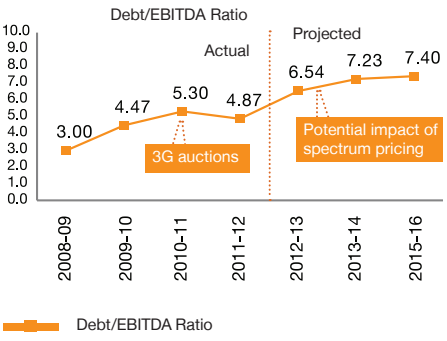
Table 9 : Debt burden of Indian telecom sector (2009 to 2012)

	2008-09	2009-10	2010-11	2011-12
Domestic Debt (Rs Cr)	46,980.00	80,807.00	94,319.00	93,594.00
External Debt in other currencies (USD Mn)	7,331.00	9,208.67	14,222.27	18,425.27
Exchange Rate (Rs per USD)	48.76	46.66	46.15	50.00
Total Debt (Rs Cr)	**82,725.96**	**123,774.65**	**159,954.78**	**185,720.35**

Source: RBI, Bank of America Merrill Lynch Wireless Matrix (4Q 2011)

In our experience once Debt/EBITDA ratios exceed 3.0 in the telecom sector, it becomes difficult for operators to satisfy creditworthiness to banks for further lending. Further, the industry outlook, past NPAs from the industry determines the interest rates and their lenders willingness to lend. Including domestic and external debt, the Debt /EBITDA ratio in Indian telecoms has risen from 3.00 in 2009 to 4.87 in 2012 (see Chart 3). Assuming the spectrum acquisitions going forward will be debt-funded, the Debt/EBITDA ratio impact *due only to spectrum auctioning,* will further rise to 7-8x by 2015-16 (refer to table 12). *This excludes the additional funding* that may be required for major activities such as network expansion, or indeed costs associated with implementing spectrum refarming.

Chart 3: Indian telecom sector Debt/EBITDA ratios 2008-2015



Source: RBI, BofA Merrill Lynch 4Q 2011, PwC analysis

Current debt includes borrowings that could potentially become non-performing for lenders, due to cancellation of licenses or operator exits from the market. We expect that such outcomes for the industry may result in further difficulties for existing telecom operators to borrow more, since risk factors associated with lending to the industry would rise.

Assuming the spectrum acquisitions as set out by TRAI in its recommendations are debt-funded, we estimate that the industry will need to further increase its current debt burden of INR 185,720 Cr by approximately 272,000 INR Cr over the next 5 years (refer table 11). The immediate financial performance impacts of this are likely to be negative, and coming on the back of the heavy impacts of 3G on industry borrowing, would add a grave additional debt burden on the sector.

4. Cost per minute to translate to higher tariffs

Indian mobile operators have been struggling to maintain profitability, a fact that we have documented clearly in previous analysis (see our report of September 2011). In our assessment of recent operator Profit After Tax (PAT) and EBITDA margin performance, it is clear that there is no room for operators to absorb further cost increases. Our assessment in this paper has shown that the cost increases associated with TRAI's proposed spectrum policy will be significant and that they will have immediate and long-term financial impacts.

It is therefore unlikely that the industry will be in any position to absorb any such cost burdens. In our view it is likely that operators will be forced to impose tariff increases as a result of the cost increases.

The potential tariff impact can be assessed in various ways, but simply put we have calculated the tariff impact from a simple pass-through of the cost to the operator. This results in a cost increase from spectrum of 26 paisa per minute resulting in a tariff increase of 34 paisa, reflecting the added impacts of spectrum license fees and service tax.

When calculated using the EMI method adopted by TRAI, the impact of the additional spectrum cost in the 20 year period from 2012-13 to 2031-32 is Rs 2,69,000 Crores (calculated at present value with 15% discount rate) instead of Rs 93,721 Crores as estimated by TRAI. Accordingly incremental cost per minute assessed/ estimated should be nearly 2.87 times the estimate on account of this.

Table 10: Impact of TRAI recommendations on cost per minute

All values in INR

Description	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31	FY32
As per TRAI (voice and data)	**0.044**	**0.040**	**0.036**	**0.033**	**0.031**	**0.029**	**0.028**	**0.027**	**0.026**	**0.024**	**0.024**	**0.022**	**0.022**	**0.020**	**0.020**	**0.018**	**0.018**	**0.018**	**0.018**	**0.016**
Adjustment for MOU Projections overstated	0.000	0.004	0.008	0.011	0.012	0.014	0.015	0.017	0.018	0.019	0.021	0.021	0.023	0.023	0.025	0.023	0.025	0.026	0.027	0.025
Cost of spectrum adjustment to service the current MOU volume	0.082	0.082	0.082	0.082	0.082	0.082	0.082	0.082	0.082	0.082	0.082	0.082	0.082	0.082	0.082	0.082	0.082	0.082	0.082	0.082
Add adjustment for excluding incoming minutes	0.134	0.134	0.134	0.134	0.134	0.133	0.133	0.134	0.134	0.133	0.135	0.134	0.136	0.134	0.135	0.132	0.133	0.134	0.136	0.132
Estimate of Cost per Minute (post adjustment for in-consistent outlook/ assumption)	**0.261**	**0.261**	**0.260**	**0.261**	**0.259**	**0.258**	**0.259**	**0.260**	**0.261**	**0.258**	**0.263**	**0.259**	**0.264**	**0.259**	**0.262**	**0.255**	**0.258**	**0.261**	**0.263**	**0.255**

Source: TRAI, PwC Analysis

1. MOU are likely to decline as per past trend, data revenues grow and also as marginal subscribers are added with increase in penetration. On a conservative basis we have assumed a no growth scenario
2. The spectrum cost included in annexure 7 of the document is understated as explained in point 1.1 of this report. The adjustment made in the above table pertains to arriving at the cost of spectrum required to service the current volumes and also growth in Volume of Minutes at reserve prices.
3. The Minutes as mentioned in annexure 7 of the document include outgoing and incoming minutes refer point 1.2 of the report. We have accordingly adjusted for exclusion of the incoming minutes, based on data for Dec 2011.
4. The additional spectrum cost on license extension has been taken on a pro-rata basis for the period covered in the table and computed an EMI based on net present value basis using the TRAI given rate of 15%.

We explain the computation of impacts taking FY 14 as an illustration:

Line 1: TRAI cost impact= 4.0 paisa *4.0*

Line 2: Formula: (TRAI projected MoU/ FY 13 MoU) x TRAI cost impact) – TRAI cost impact
Computation: (374286 Cr Mins / 340286 Cr Mins) x 4.0) – 4.0 = 0.4 paisa *0.4*

Line 3: Formula: (PV of spectrum for all spectrum extensions for 20 years / TRAI recommendation spectrum valuation) x TRAI cost impact) – TRAI cost impact
Computation: (269,341 Cr/93,721 Cr) x 4.4) – 4.4 = 8.2 paisa *8.2*

Line 4: Formula: (MOU per sub per month/ MOU per sub per month) x Total cost impact)– TRAI cost impact
Computation: (332/161) x (4.0 + 0.4 + 8.2)) – (4.4 + 0. 4 + 8.2)= 13.4 paisa *13.4*

Table 11: Spectrum license extension cost at TRAI base price

All values in INR Crores

Description	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28
Spectrum cost for 122 cancelled licenses	**93,722**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cost of license extension of 900 MHz spectrum	-	59,293	46,232	16,449	28,323	8,957	-	62,856	10,172	-	-	14,662	-	-	-	-
Cost of license extension of 1800 MHz spectrum	-	6,898	4,086	1,272	16,302	1,702	-	16,747	100,649	-	-	3,422	-	83,119	1,300	75,456
Total for each year	**93,722**	**66,192**	**50,318**	**17,722**	**44,625**	**10,659**	**-**	**79,603**	**110,822**	**-**	**-**	**18,084**	**-**	**83,119**	**1,300**	**75,456**
Total cost in period FY13 to FY 17	**272,578**															
Total cost in period FY 13 to FY 32	**651,620**															

Source: TRAI, PwC Analysis

Table 12: Debt to EBITDA ratio of Indian telecom sector

The Debt to EBITDA ratio of Indian telecom sector is expected to increase on account of the additional debt burden due to higher spectrum charges.

All values in INR Crores

	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2015-16
Domestic Debt	46,980.00	80,807.00	94,319.00	93,594.00			
External Debt in other currencies	7,331.00	9,208.67	14,222.27	18,425.27			
Exchange Rate	48.76	46.66	46.15	50.00			
Spectrum Auction Debt					93,721.87	66,191.54	50,317.71
Total Debt	82,725.96	123,774.65	159,954.78	185,720.35	279,442.22	345,633.76	395,951.46
EBITDA	27,561.59	27,667.05	30,193.18	38,148.00	42,707.90	47,812.84	53,528.00
Debt/EBITDA Ratio	3.00	4.47	5.30	4.87	6.54	7.23	7.40

Source: RBI, Bank of America Merrill Lynch Wireless Matrix (4Q 2011), PwC Analysis

Note
1. No forex escalations have been considered for year beyond March 2012
2. It has been assumed that 100% of spectrum license extension fees will be serviced through debt
3. The EBITDA growth has been estimated at 12% based on the previous three years CAGR (2010-2012)

Table 13: Circle wise pending applications for spectrum

Circle Name	Pending applications (MHz)
Andhra Pradesh	21.2
Assam	6.4
Bihar	36.4
Delhi	50.4
Gujarat	19.2
Haryana	3.6
Jammu & Kashmir	2.8
Karnataka	19.4
Kerala	5.8
Kolkata	6.8
Madhya Pradesh	17.4
Maharashtra	19.4
Mumbai	9.2
North East	1.8
Orissa	10.4
Punjab	9.6
Rajasthan	16.6
Tamil Nadu	25.4
Uttar Pradesh (East)	41
Uttar Pradesh (West)	16.4
West Bengal	14.4
Total	353.6

Source: WPC, November 2011

Contacts

Mohammad Chowdhury
Executive Director, Telecom Industry Leader, PwC India
mohammad.chowdhury@in.pwc.com
+91- 9167665544

Sivarama Krishnan
Executive Director, Risk Advisory Services, PwC India
sivarama.krishnan@in.pwc.com
+91- 9650788787

Rajan S. Mathews
Director General, Cellular Operators' Association of India
rsmathews@coai.in
+91- 9999473700

About PwC

PwC firms help organizations and individuals create the value they're looking for. We're a network of firms in 158 countries with close to 169,000 people who are committed to delivering quality in assurance, tax and advisory services. Tell us what matters to you and find out more by visiting us at www.pwc.com.

In India, PwC (www.pwc.com/India) offers a comprehensive portfolio of Advisory and Tax & Regulatory services; each, in turn, presents a basket of finely defined deliverables. Network firms of PwC in India also provide services in Assurance as per the relevant rules and regulations in India.

Providing organizations with the advice they need, wherever they may be located, our highly qualified, experienced professionals, who have sound knowledge of the Indian business environment, listen to different points of view to help organizations solve their business issues and identify and maximise the opportunities they seek. Our industry specialization allows us to help co-create solutions with our clients for their sector of interest.

We are located in these cities: Ahmedabad, Bangalore, Bhubaneshwar, Chennai, Delhi NCR, Hyderabad, Kolkata, Mumbai and Pune.

This study has been commissioned by the Cellular Operators Association of India. The data used for the study has been collected from various public sources and the audited reports available with the Registrar of Companies (RoC).

AK 319 May 2012 PwC Assessment of TRAI Recommendations.indd
Designed by: PwC Brand and Communications, India

Impact of TRAI's recommendations on Auction of Spectrum on operator cost and consumer tariffs

ERNST & YOUNG
Quality In Everything We Do

COAI GSM

Table of contents

Executive summary

TRAI's recommendations on "Auction of Spectrum" include the methodology of future spectrum allocations and analysis of the impact of auction price on operator cost per minute. TRAI has estimated that the total impact will be 4.4 paise for 2012-13 (for voice and non-voice services) and 3.6 paise (for voice services).

We have assessed the assumptions made by TRAI in computing the impact of the auction prices on operator cost (given in Annexure VII and VIII of the report) and consumer tariffs (assuming margin neutrality). In addition, we have analyzed other relevant factors that should have been considered in assessing the overall impact on the cost burden and end-user tariff.

Based on our analysis, we believe the following factors have been underestimated by TRAI, and when included, will result in higher operator cost per minute and consumer tariffs than that computed by TRAI.

1. **Minutes of usage**

   1.1. TRAI has incorrectly assumed total incoming and outgoing minutes for calculation of the impact on operator cost, since only ~48% of the total number of Minutes of Usage (MOU) are outgoing and are chargeable. Taking into consideration only the outgoing minutes, the minimum impact on consumer tariff on account of this factor will be twice the impact computed by TRAI (given all other assumptions made by TRAI).

   1.2. The average growth rate in MOU assumed by TRAI is aggressive. Assuming an average growth rate of 5% in MOU over the next five years (industry analyst projections) against the 10% growth assumed by TRAI, the impact on operator cost and consumer tariff in 2013 due to this factor would be 6%–8% more than that computed by the regulator.

   1.3. An MOU growth rate of ~160% over a period of 20 years, assumed by TRAI in Annexure VII, is unrealistic. Given this growth rate, MOU per sub will increase by 84% over 20 years, which is contrary to historical trends indicating year on year decline in MOU per subscriber since 2008.

   1.4. The impact on operator cost may be understated since the MOU growth assumed by TRAI does not include the effect of price elasticity. As the cost per minute, and hence tariffs, rise, the growth in MOU will be less than that assumed by TRAI.

2. **Spectrum considered by TRAI to calculate impact**

   2.1. The impact of INR93,721 crore (on account of 576.2 MHz of spectrum in 1800 MHz band) computed by TRAI is understated since the actual spectrum cost to the industry should include the cost associated with extension of license in addition to the cost of spectrum to be auctioned. Given the costs mentioned above, the impact on operator cost due to underestimation of the spectrum cost is likely to be approximately three times - at INR280,000 crore – the impact computed by TRAI.

   2.2. The cost of additional spectrum and/or network coverage required to service the MOU growth projected by TRAI has not been included by it in computing the overall impact on operator cost.

   2.3. The additional spectrum costs will increase the financial risk of operators and their ability to raise debt, the cost of debt and their ability to service debt.

3. **Share of non-voice services**

3.1. TRAI's assumption of non-voice revenues contributing 50% to total revenues is aggressive. Globally, the contribution of non-voice revenue to total revenue stands at 34%, with there being very few markets where non-voice revenue contributes 50% of the industry revenue.

3.2. The impact computed by TRAI does not include the cost of deploying high-speed data networks to achieve the 50% non-voice revenue share assumed by it. Furthermore, it does not include the cost of existing operators extending the license to achieve the projected growth in non-voice revenue. This may lead to high data tariffs, depriving the Indian consumer of the benefit of affordable high-speed data services.

4. **Other factors impacting industry cost and consumer tariffs**

4.1. TRAI has recommended auction of minimum 5 MHz spectrum in the 1800MHz band, i.e., ~20% of the available spectrum, which would result in artificial scarcity. This may drive up prices and increase the overall operator cost.

4.2. Furthermore, since the reserve price for future spectrum auctions will be benchmarked to the current auction price, this may inflate the reserve price for future auctions as well.

4.3. TRAI has incorrectly linked the reserve price to the 3G bid price and has assumed that the revenue or cash flow profile resulting from using the auctioned spectrum will be similar to that from using broadband networks. This kind of revenue or cash profile may not be feasible, given the current state of the LTE ecosystem and the fact that existing operators neither have sufficient spectrum nor are likely to receive adequate spectrum during the forthcoming auction.

4.4. An analysis of the annual EMI for all spectrum-related costs as a percentage of annualized ARPU in 2013 indicates that spectrum-related payments are likely to be as high as 133% in the metros and 45% at an all-India level. This highlights the fact that there would be wide variations across circles and that national averages do not reflect circle-specific differences.

4.5. The impact on regulatory cost, and hence cost per minute, will significantly vary among operators, depending on whether an operator is a new entrant, is an existing operator seeking extension of license or one who is not seeking extension of license in the near future. The differential impact is expected to destroy the level playing field between different operators.

TRAI's recommendation on Auction of Spectrum: Annexure VII

Impact of Auction Fees on wireless (GSM) services segment (using EMI method)

	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32
Projected Growth in MoU	15%	10%	10%	10%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	3%	3%	3%	3%	3%	3%
Total projected MOU for wireless (GSM) services (crore)	340260	374286	411714	452886	475530	499307	524272	550485	578010	606910	637256	669118	702574	737703	759834	782629	806108	830291	855200	880856
Auction fee For 1 Mhz (Rs. crore)	3622																			
Auction Fee For 576.2 Mhz on pan India basis (Rs. in crore)	93721																			
Annualised EMI (Rs. in crore) for Auction fee i.e. Rs.93721 crore after considering interest @15%	14808	14808	14808	14808	14808	14808	14808	14808	14808	14808	14808	14808	14808	14808	14808	14808	14808	14808	14808	14808
Impact of EMI (per minute) (Rs.) i.e. Annualised EMI/MoU	0.044	0.040	0.036	0.033	0.031	0.030	0.028	0.027	0.026	0.024	0.023	0.022	0.021	0.020	0.019	0.019	0.018	0.018	0.017	0.017
EMI per minute amortised from revenue from non-voice services (Rs.)	0.008	0.008	0.009	0.009	0.009	0.010	0.011	0.012	0.013	0.012	0.012	0.011	0.011	0.010	0.010	0.009	0.009	0.009	0.009	0.008
EMI per minute amortised from revenue from voice services (Rs.)	0.036	0.032	0.027	0.024	0.022	0.019	0.017	0.015	0.013	0.012	0.012	0.011	0.011	0.010	0.010	0.009	0.009	0.009	0.009	0.008
Assumptions:-																				
(i) The amount of spectrum available in the 1800 MHz band is 576.20 MHz.																				
(ii) Reserve price per MHz is based on 3G auction prices per MHz for different service areas in 2010-11, which are indexed to 2010-12 using BSI average PLR rate @ 12.63%. This has further adjusted																				
with an efficiency factor 1.2 for 1800 MHz over the 3G band. 80% of the computed value has been adopted as the reserve price of Rs. 3622 crore per MHz.																				
(iii) The total number of Minutes of Usage (MOUs) - 257285 crore minutes for wireless (GSM) services in 2010-11 has been taken as base for future projection of MoUs for 20 years (from 2012-13 to 2031-32).																				
(iv) The EMI for the auction money based on reserve price calculated for 20 years @ 15% per annum has been annualized. Return on Capital Employed @ 15% used by the Authority in past exercises has been taken as rate of interest for the purpose of calculating EMI.																				
(v) The share of annualized EMI met out of revenue generated from non-voice services increases from 10% in the year 2012-13 to 30% in the year 2016-17, 40% in the year 2018-19 and 50% from the year 2020-21 onwards																				

*Note: The impact, wherever stated, is in comparison with the impact of 4.4 paise per minute computed by TRAI.

- Incorrect assumption of total incoming and outgoing minutes
- MOU growth of ~160% over 2012–2032 unrealistic
- Average growth rate in MOU very high; impact 6% higher
- Cost per minute to be higher on account of price elasticity

- Reserve price incorrectly linked to 3G price
- Material differences in impact across circles/ operators
- Annual EMI per sub as a percentage of ARPU at 133% in the metros in 2013
- Total spectrum cost three times higher at ~INR280,000

- 50% share of the revenue from non-voice services unrealistic
- Cost associated with deploying high-speed network for data not included

Based on the analysis given above, the impact on operator cost will be on an average at least six times more than that computed by TRAI, when corrected for two factors, i.e., the additional spectrum cost and accounting for only outgoing minutes. Furthermore, factors such as price elasticity, the share of non-voice revenue, additional network costs and MOU growth could have an additional impact on operator cost and consumer tariffs.

1. Introduction

TRAI issued its recommendations related to Auction of Spectrum on 23rd April 2012. The key issues covered as part of its recommendations include the methodology for future spectrum allocations, the establishment of the reserve prices for different spectrum bands, spectrum re-farming and auction- related aspects including auction timelines, extension of license, validity of spectrum, spectrum usage charges, payment mechanism and rolling out of obligations.

In its recommendations, TRAI has also analyzed the impact of the auction price on per minute cost to operators over a period of 20 years (2012–2032). The analysis has been carried out by using the Equated Monthly Installment (EMI) method and considering two cases, one that shows the impact on the overall GSM services segment (Annexure VII) and the other that shows the impact on a hypothetical GSM operator (Annexure VIII).

The impact on operator cost per minute as computed by TRAI is 4.4 paise per minute for 2012–13.

2. Key assumptions made by TRAI to compute impact of auction price on operator cost per minute

Auction pricing will have an impact on the overall industry cost structure. We have analyzed Annexure VII and VIII, in which TRAI has computed the impact on the overall GSM services segment and on a hypothetical service provider. The key assumptions made by TRAI are given below:

2.1. MOU: Actual data on total GSM MOU, incoming and outgoing, for 2010–11 has been taken as the base for future projection of MOUs for 20 years (from 2012–13 to 2031–32). The growth rates assumed for the different time periods are provided below:

Years	2011-13	2013-16	2016-2026	2026-32
Overall MOU Growth rates (%)	15%	10%	5%	3%

2.2. Reserve price per MHz of 1800 MHz spectrum: The reserve price per MHz is based on 3G auction prices per MHz for different service areas in 2010–11, which are indexed to 2011–12, using the State Bank of India (SBI) average PLR rate @ 12.63%. This has been adjusted further with an efficiency factor of 1.2 for 1800 MHz over the 2.1GHz band and 80% of the computed value has been adopted as the reserve price of INR3,622 crore per MHz.

2.3. Total spectrum considered to calculate impact of auction prices on operator costs: The spectrum available in the 1800 MHz band (576.20 MHz) has been considered. It comprises:

- 365.2 MHz spectrum available from cancelled licenses (total spectrum available from cancelled licenses is 413.6 MHz out of which 48.4 MHz is available in less than 75% of LSA, and hence, has not been considered for auction)
- 211 MHz already available with Wireless Planning Commission (WPC)

2.4. EMI computation of total auction price paid: The annualized EMI for the auction price, based on reserve price, has been calculated for 20 years, taking an interest rate of 15% per annum.

2.5. Share of non-voice services in overall EMI: The share of annualized EMI, met out of the revenue generated from non-voice services, has been increased from 18% in 2012–13 to 30% in 2016–17, 40% in 2018–19 and 50% from 2020–21 onwards.

3. Critique on key assumptions made by TRAI on impact of auction price on operator cost

3.1. Our approach

- We have analyzed the key assumptions made by TRAI in Annexure VII and VIII of the report on computing the impact of auction prices on operator cost.
- In addition, we have assessed other relevant factors that should be considered to gauge the overall impact on the cost burden and end-user tariff:
  - Additional spectrum costs due to extension of license
  - Purchase of 900 MHz spectrum for business continuity
  - Overall impact on financing of spectrum, the key one being the impact of the additional debt burden on telecom operators as well as the exposure of the banking system to spectrum financing
- Thereafter, we have computed the impact on the operator cost, based on our revised assumptions.

3.2. Assessment of key assumptions made by TRAI

A. Growth and composition of MOU

1. Incoming and outgoing minutes included; impact on consumer tariff underestimated by factor of 2

TRAI has assumed incoming and outgoing minutes for computation of the impact on operator cost. However, only 48% of the total MOU assumed by TRAI are outgoing ones, as given below:

Table 1: Incoming and outgoing minutes as per TRAI

MOU – GSM (minutes per month – Dec 2011)[1]		
Incoming	171	52%
Outgoing	161	48%
Total	332	

Source: " Telecom Services Performance Indicator Report", Quarter ending Dec 2011

Given that only outgoing minutes are chargeable, the impact on operator cost should only be computed on the basis of these.

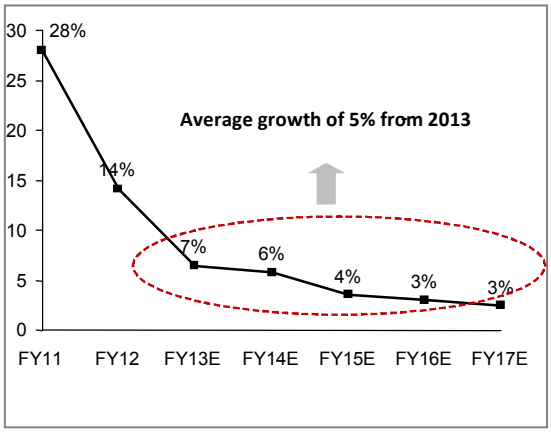
To illustrate this, while the claimed per minute cost in year one for the industry will increase by INR 0.04, if this cost is to be margin neutral to the industry, the impact on consumer tariff will be twice of this (assuming only outgoing minutes and given that all other TRAI assumptions hold).

2. Average projected growth rate in MOU very high

TRAI has estimated that the average projected growth in MOU will be 10% over the next five years, against 5% projected by industry analysts. This is depicted in Figure 1 below:

[1] Source: TRAI

Figure 1: India: projected wireless MOU growth rate (%)



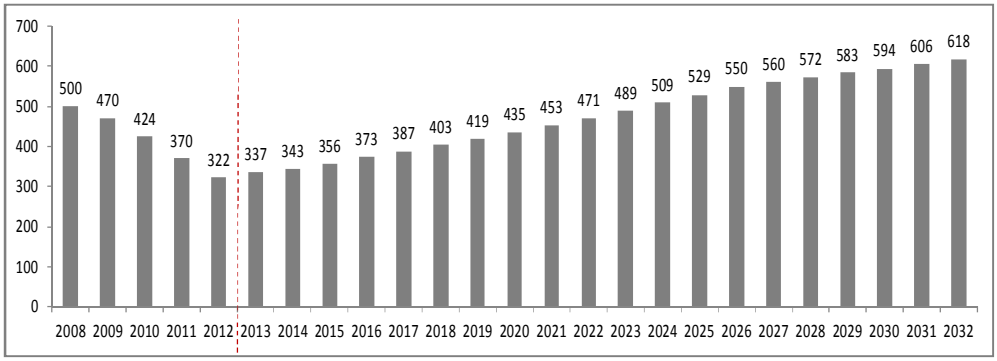
Source: "India Wireless" JM Financial, 11 January 2012, via Thomson Research.

Assuming an average growth rate of 5% from 2013-17, the impact on operator cost and consumer tariff in 2013 will be 6% more than that computed by TRAI.

3. TRAI's assumption on increase in MoU per subscriber in contrast to the historical trend

TRAI has assumed that MOU will grow ~160% over a period of 20 years (2012–2032), as detailed in Annexure VII. Given the GSM subscriber growth (41%) assumed by TRAI in Annexure VIII and the MOU growth in Annexure VII, the MOU per subscriber will increase by 84% over the next 20 years, from 337 in 2012–13 to 618 in 2031–32. This is contrary to historical trends, which indicate that MOU/ sub have been falling over the last few years.

Figure 2: Historical MOU and estimated MOU per TRAI's computation

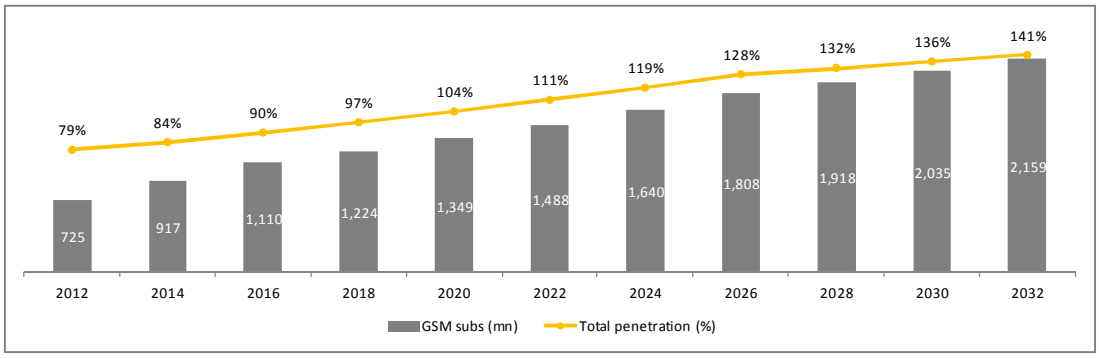


Source: TRAI, Key Performance Indicators Report for 2008-2012, TRAI's recommendations on auction of spectrum, 23 April 2012.

Furthermore, if we assume that the MOU/ sub remain at the current level,[2] then the subscriber growth required to achieve the MOU growth[3] mentioned above – reaching ~2,159 million subscribers in 2032 with penetration level of 141%[4] – seems unrealistic.

2 Source: Annexure VIII of TRAI recommendations on auction of spectrum, 23 April 2012.
3 Source: Annexure VII of TRAI recommendations on auction of spectrum, 23 April 2012.
4 Source for Population projection: World Bank estimate.

Figure 3: Estimated GSM subscribers (m) and penetration level (%)



Source: TRAI's recommendations on Auction of Spectrum, 23 April 2012, Ernst & Young analysis

4. Possibility of impact on operator cost being understated since effect of price elasticity is not considered

TRAI has not considered the impact of price elasticity on the average MOU consumed by a user, i.e., as the cost per minute, and hence tariffs rise, the growth in MOU will be less than that assumed by TRAI. Industry reports[5] indicate that an average tariff increase of ~20% by leading Indian operators in 2Q2011 resulted in a sharp decline in MOU (2.6-6.9%), with price elasticity ranging from 1.3 to 5.

B. Reserve price per MHz of 1800 MHz spectrum

1. Reserve price incorrectly linked to 3G price

By linking the reserve price to the 3G bid price, TRAI has made an assumption that the revenue or cash flow profile resulting from using this spectrum will be similar to that from using broadband networks. Given the current state of the LTE ecosystem, it seems unlikely that LTE networks will be deployed at this stage by any new operator.

Existing operators are unlikely to get adequate spectrum during the forthcoming auctions (refer to point 3.22 and 3.24 of TRAI's report) to roll out LTE in this band. Moreover, they do not have sufficient spectrum to service their existing 2G and/or 2.5G subscribers, especially in areas where the need for LTE may have arisen earlier. Therefore, it is highly likely that this spectrum will be used to offer 2G and/or 2.5G services. The revenue and cash flow profile of such services cannot support the price per MHz suggested by TRAI.

2. Auction of ~20% spectrum in 1800 MHz band resulting in artificial scarcity

TRAI has recommended the auction of a minimum of 5 MHz spectrum in the 1800 MHz band, i.e., ~20% of the available spectrum. This will create artificial scarcity and drive prices higher, which will in turn increase the overall cost per minute of the operator.

3. TRAI attempting to set reserve price close to clearing price and not allowing market forces to determine true value of spectrum

As observed in the case of 3G and/or BWA auctions, the clearing price significantly exceeded the reserve price of the spectrum (~5.8 and 7.3 times, respectively). This was a function of the level at which the price was set and the market demand.

In its recommendations, TRAI has factored in the high demand for spectrum in setting the reserve price. This is contrary to the principle of market-determined pricing.

[5] Ambit Capital: December 2011.

4. Material differences in impact across circles

An analysis of the annual EMI for all spectrum-related costs[6] as a percentage of revenues on an all India basis suggests that 45% of the revenues would go toward payment of spectrum-related costs. The impact is as high as 133% in the metros and highlights the fact that national averages do not reflect circle-specific differences.

Table 2: Impact of proposed spectrum reserve fees by circle category

Category of Circle	GSM ARPU FY 13 (INR)	Annualized GSM ARPU (INR/year)	GSM Subscribers FY 13 (Mn)	EMI per year (Crores)	EMI per Sub (INR/Sub)	EMI per Sub as % of annulalized ARPU
Metro	118	1,416	98	18,455	1,878	133%
Circle A	101	1,212	307	18,745	611	50%
Circle B	82	984	345	5,244	152	15%
Circle C	85	1,020	120	838	70	7%
All India Average	**93**	**1,116**	**871**	**43,281**	**497**	**45%**

Source: TRAI's recommendations on Auction of Spectrum, 23 April 2012, "India Wireless" JM Financial, 11 January 2012, via Thomson Research, Ernst & Young analysis.
Note: The calculations given above include the spectrum cost of 576.2 MHz spectrum in the 1800 MHz band proposed to be auctioned and the extension-linked cost of 900 MHz and 1800 MHz spectrum currently held by all operators.

5. Material differences in impact across operators

The impact will vary materially, depending on whether the operator is a new entrant, is an existing operator seeking extension of license or an existing operator who is not seeking extension of license in the near future. This can be witnessed in TRAIs computation in Annexure VII and Annexure VIII and indicates that at an industry level, the EMI per minute in year one is INR0.04, but for a single operator the EMI is as high as INR0.14.

For a new operator in a circle where economics are weak (as mentioned above), the overall cost may be prohibitive. Apart from this, TRAI's computations have not differentiated between an existing operator seeking extension of license and one not seeking this in the near future. The variable impact across different categories of operators is expected to destroy the level playing field in the industry.

C. Share of non-voice services in overall EMI to increase from 18% in 2013 to 50% in 2021

1. Current non-voice revenue at 12%–14%

While TRAI has estimated that the current non-voice revenue in the industry is 18%, industry estimates indicate that they only contribute between 12%–14% of the telecom industry's revenues, the bulk of which is generated from SMS or ring tones, with mobile broadband services accounting for a very small share.

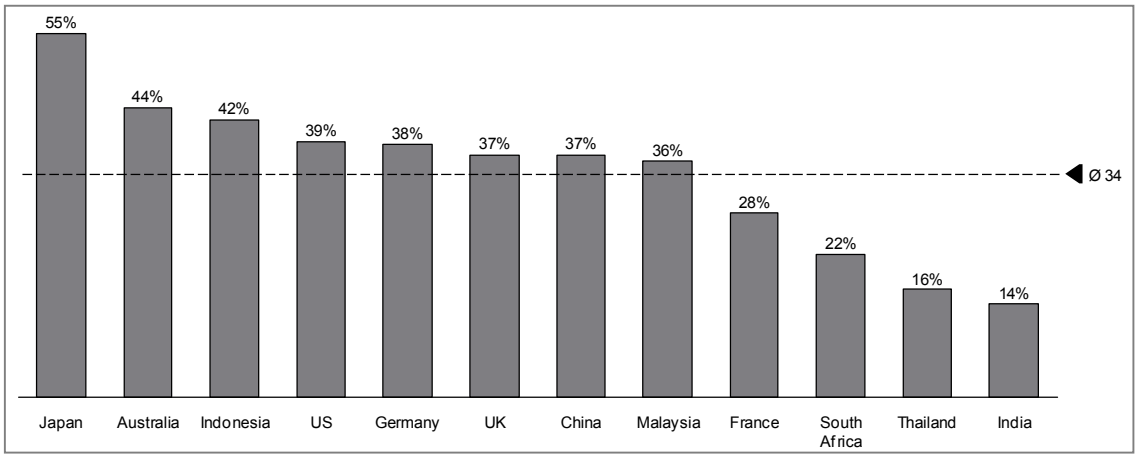
2. Limited telecom markets where non-voice revenue contributes 50% of the industry's revenue

Most of these markets have achieved such a high contribution from non-voice services due to the availability of high-speed networks and uptake of mobile broadband access.

In fact, the global average share of non-voice revenue in the segment's total revenue is 34%, as depicted in Figure 3 below. Therefore, it is unlikely that the share of non-voice revenue will increase to 50% by 2021 as assumed by TRAI.

[6] Cost of 576.2 MHz of 1800 MHz spectrum proposed to be auctioned and the extension-related cost of the 900 MHz and 1800 MHz spectrum currently used by operators

Figure 4: Mobile data as % of revenue



Source: Global Wireless Matrix, Q4 2011, Merrill Lynch

Note – High data contribution to revenue across most countries is owing to the deployment and adoption of 3G and 4G technology.

3. TRAI's assumption that a large share of the revenue will come from non-voice services unrealistic

1. Such a high percentage of non-voice revenue is unlikely to come from usage of 2G or 2.5G networks.
2. High-speed data networks will need to be deployed to achieve this revenue profile.
3. Currently, the LTE ecosystem is under-developed.
4. The cost associated with deploying such networks is not included in TRAI's computation.

This will have a significant impact on the cost per unit (data or voice) and may result in very high data tariffs. This will deprive the Indian consumer of the benefit of affordable high-speed data services.

4. Other relevant factors to be considered for computation of impact

A. Spectrum to be considered for calculating impact

1. Total spectrum cost underestimated

TRAI's computation in Annexure VII indicates that impact on operator cost is based on auction of 576 MHz of spectrum (1800 MHz band) for INR93,721 crore. However, the actual spectrum cost to the industry is not limited to that incurred during this auction, but must also include the cost associated with extension of licenses, which is benchmarked to the current auction price. We believe that the total spectrum cost is ~INR280,000 crore[7], compared with INR93,721 crore computed by TRAI. The break-up is as follows:

- Auction of 576 MHz: INR93,721 crore
- Extension of license of existing operators (1800 MHz): INR57,000 crore
- Purchase of 900 MHz spectrum for business continuity: INR129,000 crore

Therefore, given the cost calculated above and using TRAI's EMI methodology, the true impact on operator cost and consumer tariffs in 2015 will be approximately three times that computed by TRAI.

[7] Spectrum cost is prorated up to 2032. The absolute spectrum cost for the entire license-extension duration of 20 years will be higher.

2. **Additional spectrum and/or network cost not considered**

The cost of additional spectrum and/or network coverage required to service the MOU growth projected by TRAI needs to be included in computation of the overall impact on operator cost.

3. **License extension charges not included in impact of reduced Spectrum Usage Charges (SUC)**

The SUC on spectrum bought through the auction or by extension of license will be 3% of the Adjusted Gross Revenue (AGR) (versus 3%–8%, based on spectrum held). This implies that existing operators can only benefit from reduced SUC after payment of license-extension charges that are linked to the current reserve price. This needs to be included in computing operator cost.

B. Impact on operator financials and funding

1. **Operator balance sheets already stressed with Net Debt/EBITDA of more than 3.0X**

Before 2010, Indian telecom players[8] were under-leveraged, as compared to global players, with a Net Debt/EBITDA of 1.5x, as compared to the global average of 2.1x. However, after the recently held auction of 3G and BWA spectrum, the average Net Debt/EBITDA of domestic telecom players has crossed 3.0x, as depicted in Figure 4 below:

Figure 5: Net debt/EBITDA[9]

Source: Bharti, Idea, Reliance Communications financial data, Capital IQ, accessed 15 May 2012.

Additional spectrum costs will only further exacerbate these ratios, and thereby increase the financial risk of operators.

2. **Operator ability to raise and service debt to be constrained**

The total outflow of spectrum at the reserve price will be ~INR280,000 crore. Assuming that 70% of this outflow will be funded by banks, ~INR196,000 crore will be required over the next few years. The already large exposure of banks to the telecom sector (with a gross credit exposure of INR100,000 crore as on June, 2011, with INR23,000 crore accounted for by SBI alone)[10] and the negative view of the industry (due to cancellation of licenses and statements by leading global telecom operators desiring to withdraw from the Indian market) will make it difficult for operators to raise and service debt. Moreover, the cost of debt is also likely to go up.

[8] Based on information relating to publicly listed telecom players in India
[9] As on March 31, 2010 and 2011.
[10] Source: Hindu Business Line: Banks nervous about telecom exposure, December 15, 2011.

5. Conclusion

Our analysis of the key assumptions made by TRAI in its computation of the impact on operator cost highlights the fact that several factors have been underestimated, and when included, will result in increased operator cost per minute and consumer tariffs.

Based on the analysis given above, the impact on operator cost, on an average, will be at least six times more than that computed by TRAI, when the two factors – additional spectrum cost and accounting for only outgoing minutes – are corrected.

Furthermore, as highlighted in the report, factors such as price elasticity, the share of non-voice revenue, additional network costs and MOU growth could have an additional impact on consumer tariffs. These factors should be analyzed further to determine the overall impact on operator cost and consumer tariff.

Notes

Our offices

Ahmedabad
2nd floor, Shivalik Ishaan
Near. C.N Vidhyalaya
Ambawadi,
Ahmedabad – 380 015
Tel: + 91 79 6608 3800
Fax: + 91 79 6608 3900

Bengaluru
12th & 13th floor
"U B City" Canberra Block
No.24, Vittal Mallya Road
Bengaluru – 560 001
Tel: + 91 80 4027 5000
+ 91 80 6727 5000
Fax: + 91 80 2210 6000 (12th floor)
Fax: + 91 80 2224 0695 (13th floor)

Chandigarh
1st Floor
SCO: 166-167
Sector 9-C, Madhya Marg
Chandigarh – 160 009
Tel: + 91 22 6192 0000

Chennai
Tidel Park,
6th & 7th Floor
A Block (Module 601,701-702)
No.4, Rajiv Gandhi Salai
Taramani
Chennai – 600 113
Tel: + 91 44 6654 8100
Fax: + 91 44 2254 0120

Hyderabad
Oval Office
18, iLabs Centre,
Hitech City, Madhapur,
Hyderabad – 500 081
Tel: + 91 40 6736 2000
Fax: + 91 40 6736 2200

Kochi
9th Floor "ABAD Nucleus"
NH-49, Maradu PO,
Kochi – 682 304
Tel: + 91 484 304 4000
Fax: + 91 484 270 5393

Kolkata
22, Camac Street
3rd Floor, Block C"
Kolkata – 700 016
Tel: + 91 33 6615 3400
Fax: + 91 33 2281 7750

Mumbai
6th Floor Express Towers
Nariman Point
Mumbai – 400 021
Tel: + 91 22 6192 0000
Fax: + 91 22 6192 2000

14th Floor, The Ruby
29 Senapati Bapat Marg
Dadar (west)
Mumbai – 400 028
Tel + 91 22 6192 0000
Fax + 91 22 6192 1000

5th Floor Block B-2,
Nirlon Knowledge Park
Off. Western Express Highway
Goregaon (E)
Mumbai – 400 063
Tel: + 91 22 6192 0000
Fax: + 91 22 6192 3000

NCR
Golf View Corporate
Tower – B
Near DLF Golf Course,
Sector 42
Gurgaon – 122 002
Tel: + 91 124 464 4000
Fax: + 91 124 464 4050

6th floor, HT House
18-20 Kasturba Gandhi Marg
New Delhi – 110 001
Tel: + 91 11 4363 3000
Fax: + 91 11 4363 3200

4th & 5th Floor, Plot No 2B,
Tower 2, Sector 126,
Noida – 201 304
Gautam Budh Nagar, U.P. India
Tel: + 91 120 671 7000
Fax: + 91 120 671 7171

Pune
C–401, 4th floor
Panchshil Tech Park
Yerwada (Near Don Bosco School)
Pune – 411 006
Tel: + 91 20 6603 6000
Fax: + 91 20 6601 5900

Ernst & Young Pvt. Ltd.

Assurance | Tax | Transactions | Advisory

About Ernst & Young

Ernst & Young is a global leader in assurance, tax, transaction and advisory services. Worldwide, our 152,000 people are united by our shared values and an unwavering commitment to quality. We make a difference by helping our people, our clients and our wider communities achieve their potential.

Ernst & Young refers to the global organization of member firms of Ernst & Young Global Limited, each of which is a separate legal entity. Ernst & Young Global Limited, a UK company limited by guarantee, does not provide services to clients. For more information about our organization, please visit www.ey.com

Ernst & Young Pvt. Ltd. is one of the Indian client serving member firms of EYGM Limited. For more information about our organization, please visit www.ey.com/india

Ernst & Young Pvt. Ltd. is a company registered under the Companies Act, 1956 having its registered office at 22 Camac Street, 3rd Floor, Block C, Kolkata - 700016

About COAI:

The Cellular Operators Association of India (COAI) was constituted in 1995 as a registered, non-profit, non-governmental society dedicated to the advancement of communication, particularly modern communication through Cellular Mobile Telephone Services. With a vision to establish and sustain a world-class cellular infrastructure and facilitate affordable mobile communication services in India, COAI's main objectives are to protect the common & collective interests of its members. Prominent private service providers and the infrastructure vendors are members of COAI, and work closely on various Industry issues.