

Reliance Communications Ltd. (RCom) response to TRAI Consultation Paper on Reserve Price for Auction of Spectrum in the 800 MHz band

Reliance Communications Ltd (RCom) welcomes the opportunity to comment on issues concerning reserve price for Auction of spectrum in the 800 MHz band.

Executive Summary:

- A. All 800 MHz spectrum which is currently available with DoT should be put up for auction of spectrum in 800 MHz band as has been done recently for 1800 MHz band auction slated to be held in Feb 2014.
- B. The minimum block size to be auctioned in 800 MHz band should be fixed to 1.25 MHz.
- C. Similar to the recent 800 MHz auction held in March'13, existing operators should be allowed to bid for a minimum of 1 block of spectrum, however new operator should be required to bid for a minimum of 2 blocks.
- D. **The value of 800 MHz spectrum should not be derived on the basis of the value of 1800 MHz spectrum using voice based technical efficiency factors as envisaged by TRAI.** Apropos, technical efficiency of 800 MHz band, for data services, should be evaluated as a combination of Capacity (Bandwidth Availability), Spectral Efficiency (Bit/s)/Hz) and Coverage (QoS in a geographic area). Since, the throughput for data services inherently decreases as the distance from the center of the cell increases, cells of smaller size are mandatory for deployment of LTE or LTE Advanced; thereby it precludes any area coverage benefit that 800 MHz band would have accrued vis-à-vis 1800 MHz band.
- E. **The application of efficiency factor of 1.3 for the 800 MHz band, over the valuation of 1800 MHz spectrum, for data services, would be grossly exaggerated and should not be applied.** For any technology, including LTE and LTE Advanced, the said band is challenged by lack of contiguity, limited multi carrier growth / expansion capability, limited User and Network equipment availability, lack of harmonization internationally and a diminishing subscriber and vendor base across the world. 800 MHz Band is the least popular, has the least Quantum of spectrum and thus has the lowest business potential. **Therefore, it should be at the lowest price due to almost unacceptable Techno-Economic feasibility.**
- F. For maintaining a level playing field, the corresponding and proportionate adjustment in the price of 800 MHz spectrum band, vis-à-vis the reduction in the price of 1800 MHz spectrum band, too should be effected. Accordingly, **the reserve price for 800 MHz spectrum, should be kept much lower than the already determined price of 1800 MHz during the auctions held earlier, or at the most it should be pegged at 0.65 times the latest 1800 MHz reserve price as this ratio between 800 MHz and 1800 MHz was decided by the Union Cabinet earlier.**
- G. Relative growth of data networks in the 800 MHz band is poor / miniscule. Globally 1800 MHz is used in 44% of the commercial launched LTE networks and 800 MHz is not the preferred band for LTE deployment in future. Hence, **it is highly likely that any deployment of 4G based networks in the 800 MHz band will also face similar challenges of poor ecosystem, lack of devices and network availability.**

- H. As per TRAI, CDMA operators hold approximately 25% share of the wireless revenue from data services. However, considering the total data usage of the wireless industry being 8%, the effective data revenue of CDMA operators contributes only 2% (i.e.25% of 8%) to the total wireless revenue of the mobile industry. Moreover, the quantum of spectrum available in 800 MHz band is just 2x20 MHz as compared to availability of higher spectrum in 1800/2100/2300/2500 MHz bands and therefore the potential data revenue is much lesser in 800 MHz band. As more spectrum is made available in these and other bands like 700MHz the share of data revenues from 800MHz band will get further reduced. **In all fairness, it is the bounden duty of TRAI to ensure a level playing field amongst Telecom Service providers for protecting their long term business interests by arriving at a lower reserve price for 800 MHz band from reserve price level of March 2013.**
- I. **By no means, the valuation of spectrum in this band should be based on the vintage premise of ‘Producer Surplus’.** At best it is suggested that a techno-commercial model like Discounted Cash Flow (DCF) should be adopted for determining the pricing for the 800 MHz band.
- J. **The value of spectrum in 800 MHz in India cannot be based on the international prices** as factors like ARPU, Population, Economic Development, etc. determine the valuation of spectrum and as such Indian conditions are not comparable with other countries. External metrics and examples should only be used at the most as a “sense check” as the size of the market and its revenue generation capability, in one of the states itself, can be larger than the entire country being referenced; which itself is the view of TRAI in their recommendation of September 2013.
- K. The ratio between reserve price of 800 MHz and valuation of spectrum for 800 MHz should be kept at 80% i.e. **the reserve price of 800 MHz band should be equal to 0.8 times of the valuation of spectrum for 800 MHz band.** This shall be in consonance with TRAI's recommendations on valuation and reserve price of spectrum dated 23rd April 2012 as well as September 09, 2013.

Our response to the queries raised by the Authority is as below:

Q.1. What should be the quantum of spectrum in the 800 MHz band that should be put up for auction?

RCom Comments:

1. **It is submitted that all spectrum which is available with DoT should be put up for auction.** This shall be in line with the practice being followed in current auction of Jan/Feb 14. The NIA dated Dec 12, 2013 intimated that DoT shall be auctioning all available spectrum in 1800 MHz in the Feb'14 auction.
2. TRAI proposal of enhancing availability of spectrum in 800 MHz by withdrawing CDMA spectrum from BSNL/MTNL is uncertain. The CDMA spectrum lying with PSUs is used for serving more than one million customers for voice, data and RDel services. We therefore understand that PSU's may not vacate spectrum and any action to withdraw it from PSU's may lead to litigation and higher customer dis-satisfaction and will also impact their expansion plans in future.

3. In view of the above, we don't foresee any availability/vacation of spectrum from PSUs in near future and it is recommended that **spectrum in 800 MHz band, which is currently available with DoT, should be put up for auction.**

Q.2. What should be the block size in the 800 MHz band?

RCom Comments:

1. **It is submitted that the block size in the 800 MHz band should be 1.25 MHz as:**

- 1.1. This is the globally adopted standard block size in the 800 MHz band. Moreover, DoT in the last two Auctions of Nov'12 and Mar'13 for 800 MHz band has fixed the block size of 1.25 MHz. Thus, there is no reason to fix any other block size for this band.

- 1.2. It may be recalled that TRAI had recommended a block size of 1.25 MHz in the last two auctions held in November '12 and March'13 for 1800 MHz spectrum band. However, realizing that 200 KHz is the size of the carrier for 1800 MHz GSM technology, TRAI had recommended a 200 KHz block size for this spectrum band in September'13 recommendations. Since, the carrier size of CDMA technology is 1.25 MHz, it is suggested that the block size for 800 MHz band should be kept at 1.25 MHz.

2. TRAI should appreciate that the CDMA operators are using this band from the last 16-17 years and in CDMA technology the carrier size is 1.25 MHz, thus we submit that the same should be used in future 800 MHz auction.

3. In view of the above and for ensuring active participation of TSPs in the auction of this band, following are recommended,

- 3.1. **The block size to be auctioned in 800 MHz band should be fixed to 1.25 MHz.**

- 3.2. **Minimum number of Blocks to be bid by existing operator should be one and a new operator should be allowed to bid at least 2 blocks as was mandated in Jan'13 NIA.**

Q.3. Should the value of 800 MHz spectrum be derived on the basis of the value of 1800 MHz spectrum using technical efficiency factors?

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Q.4. Is there any case for application of a lower efficiency factor (1.3) over the valuation of 1800 MHz spectrum, for determining the valuation of 800 MHz, as was done in the previous auction? If yes, give detailed reasons for the same.

RCom Comments (Q3&Q4):

1. **It is our understanding from the above questions that TRAI, in the current consultation paper has envisaged an option to determine the price of 800 MHz spectrum using the technical efficiency of 800 MHz over the 1800 MHz band as per the voice only services.** However, from the essence of the explanations provided for these questions in the

consultation paper, it clearly emerges that TRAI is looking at data services as the predominant service to be delivered through the 800 MHz band.

- In today's fast paced digital world, it is the QoS (Through put) requirement which precedes coverage for data requirement. The customer satisfaction level is derived from the speed of network (Data delivery to the User Equipment) rather than the physical area coverage. Hence, it is submitted that technical efficiency of 800 MHz for data services should be evaluated as a combination of **Capacity (Bandwidth Availability), Spectral Efficiency (Bit/s/Hz), and Coverage (QoS in a geographic area).**
- Capacity.** As per a GSMA paper on "Mobile Broadband in 1800 MHz Band" dated Jul 2011, while elaborating on the demand for mobile broadband it states that data traffic on mobile networks is growing exponentially and many mobile operators need more capacity. Later, in the paper it is brought out that 1800 MHz would significantly enhance mobile broadband capacity, if it were to be deployed for LTE. The paper quotes Glyn Roylance, Head of New radio Technology at France Telecom Orange, that "1800 MHz is the band for capacity and that they see HSPA in the short term and LTE in the longer term in this band." A graphic in the paper, showing the LTE deployment suitability in various bands is reproduced for reference below.

LTE deployment suitability of mainstream European FDD bands

Spectrum Band	Band Size	Propagation	Utilisation	Antenna system impact	Rural coverage	Urban capacity	Indoor/hotspot
800 MHz	↓	↑	↓	↗	✓	✓	
900 MHz	↓	↑	↓	↗	✓		
1800 MHz	↑	→	→	→	✓	✓	✓
2.1GHz	↗	↓	↑	↓		✓	✓
2.6GHz	↗	↑	↓	↑		✓	✓

1800 MHz band is well suited for Mobile Broadband application when considering a range of criteria

Original chart content supplied by Deutsche Telekom

- We are in agreement with TRAI's observation in the consultation paper that "Better efficiencies can be achieved only with larger carrier sizes."** Total bandwidth (20 MHz only) is a major reason why deployment of LTE in multi-carrier mode i.e. 2*5 MHz is not a feasible option for the operators in 800 MHz band considering the competitive landscape. LTE in this band is suitable for deployment as Narrow band LTE i.e. 5 MHz channels only, as against other popular bands of 1800 MHz where available quantum supports 10MHz channels in multiple telco deployment scenarios. Hence 800 MHz band does not accrue any major advantage for nextgen technologies over the current deployments. It may be concluded that **potential for Nextgen Data Services based growth is much less, especially when the same carrier of only 5MHz is being forced to be used for Voice and Data in a mixed mode of Carrier usage.**

5. **Spectral efficiency ((Bit/s)/Hz).** Spectral efficiency for a spectrum which is meant for data services is measured in terms of the (bit/s)/Hz which directly translates into the throughput that can be achieved or delivered on a certain category of UEs in the cell using that spectrum. For a channel size of 5MHz, the spectral efficiency i.e bit/s/Hz for both 800 MHz and 1800 MHz bands is the same. Further, for any technology including LTE and LTE Advance, with the same level of deployment models, exploiting the existing Tower Infra in Dense Urban/Sub urban areas having inter-tower distances of less than 400 mts and 600 mts respectively, both 800 MHz and 1800 MHz bands give the same effective Network efficiency i.e bits per Hz per sq.km. Hence, the network's ability to serve a given subscriber density, in a given Geography, is the same at the same level of QoS for both 800 and 1800 MHz bands.
6. **Technical Requirements of LTE.** As per a technical report of ETSI¹, a scenario where the User Equipment is moving at a speed of 3km/hr in an area with inter site distance, Cell i.e one Sector is 500m, has been used to verify the compliance templates described in section 4.2.4. of Report ITU-R M.2133 [7]. The capabilities addressed in this report span the throughput capabilities (QoS) from LTE Rel-8 and extend through Rel-10 and beyond. The throughput requirements from LTE network for the average capacity and average cell edge through put are as shown in the table below.

System Performance Area [bps/Hz/cell]	UL / DL	Antenna Configuration	Release 8	Release 10
			LTE ¹	LTE-A ²
Average Capacity	DL	2x2	1.69	2.4
		4x2	1.87	2.6
		4x4	2.67	3.7
	UL	1x2	0.74	1.2
		2x4	-	2
		2x2	-	-
Average Cell-edge User Throughput	DL	2x2	0.05	0.07
		4X2	0.06	0.09
		4X4	0.08	0.12
	UL	1x2	0.024	0.04
		2X4	-	0.07

7. It can be inferred from the foregoing that the through put requirements of LTE mandate deployment of the network with smaller cell size. Therefore, **800 MHz does not accrue any technical benefit over the 1800 MHz band as far as cell size is concerned.**
8. Additionally, it is brought out that the worldwide adoptability for UMTS / 3G deployment in 800 MHz band is extremely limited by an order of magnitude in scale compared to 900//2100 MHz.

¹ TR 136 912 V9.1.0 (2010-01) for a "Feasibility study for Further Advancements for E-UTRA (LTE-Advanced)" which includes the results of the work supporting the 3GPP submission of "LTE Release 10 & beyond (LTE-Advanced)", submitted to the ITU-R as a candidate technology for the IMT-Advanced

9. **Coverage:** Physical geographic area coverage parameter and the perceived advantages for 800 MHz band is no more relevant considering the deployment models in India exploiting the existing Towers and their inter Tower distances. However, delivery of data services being the main intent with which TRAI is looking at the valuations of 800 MHz band, the coverage too should be evaluated in consonance with the throughput (QoS) that would be available for the same area sized cells using different frequencies.

9.1. The argument that 800 MHz is more advantageous vis-à-vis 1800 MHz band for area coverage is not valid / applicable today in Network deployments scenario for Dense urban and Suburban areas where the Tower Infrastructure is at an inter tower distances of 400 mts to 600 mts. The Tower Infrastructure would only be used as Point of Presence (POP) for BTSs to be deployed for any technology based services launched at lower power levels. **Hence, the theory of lower bands giving advantage over higher bands for propagation is no more relevant in the current pragmatic network deployment scenario in Urban and Suburban deployments which is one of the most well known facts for any Telco today.**

9.2. **Infrastructure Eco-system (Towers).** A significant deduction from a Master of Science Thesis dated 7th May 2012, on LTE performance analysis on 800 and 1800 MHz bands, by Mr Prabhat Man Sainju, of Tampere university of Technology, Finland, is that for deployment of technologies like LTE, smaller cell size are must for delivering the requisite QoS. Hence, the technological advantage of a larger cell size that could be accrued for voice services using a lower frequency band, like 800 MHz viz-a-viz 1800 MHz, gets negated when it is used for deploying data services. In India, mobile systems provide services to almost 80% to 85% of the population. For provisioning these services, the physical infrastructure (towers), for hosting of antennas, are available at an approx distance of 300 mtrs in urban areas, 600 mtrs in Semi-urban areas and 1.8 Kms in Rural areas. **In effect there already exists an infrastructural ecosystem to support smaller cell sizes and hence the 800 band and 1800 bands have to deploy the same size cell deployment models.**

10. **800 MHz (band 5) is not a harmonized globally as well as technologically:**

10.1. Band 5 follows different definitions in different parts of the world:

- B5: UL: 824MHz-849MHz, DL:869MHz-894MHz
- B20 (DD800): UL: 832MHz-862MHz, DL:791MHz-821MHz

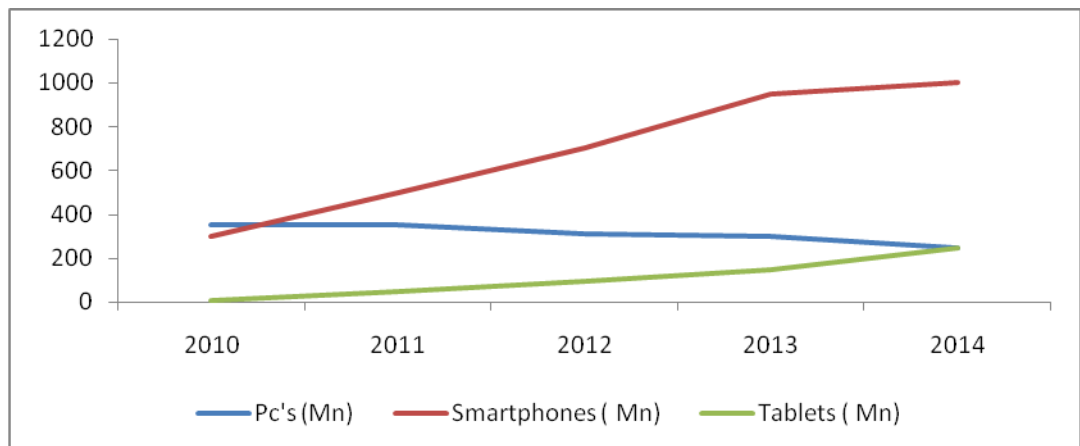
10.2. Europe is using DD800 instead of B5 (850MHz) along with 900MHz/1800MHz/2600MHz combination

Therefore, considering the non harmonized nature of Band 5 and challenged ecosystem, its prices cannot be compared to other bands esp. 1800 MHz and in turn the reserve prices of 800 MHz should be much lower than 1800 MHz.

11. **User Equipment Eco- System.** It is a well known fact that not only in India, but worldwide as well, CDMA services have a poor acceptance (Barely 10%) and proliferation as compared to GSM based services (90%). Accordingly, CDMA services in the 800 MHz band 5 are plagued by the following challenges:-

11.1. 800 MHz (Band 5) is not a widely adopted and deployed international band, and hence Network deployment, device adoption and Network infra availability economics adversely impact the value of 800 band apart from the very limited options of international roaming prospect for CDMA subscribers.

11.2. **Availability of a range of Smart Phones, Tablets and Feature phones is considerably less by an order of magnitude in the 800 MHz band as compared to other bands.** As per the recent Gartner study of Dec'13 (Graph shown below and published in Jan 13, 2014 issue of TIME magazine), while the penetration of *SIM based* smart phones and tablets are exploding and crossing the landmark of 1 billion and 250 Million respectively, the relative number of PC's is declining. Now, considering the fact that smart phones availability for CDMA technology is miniscule as compared to other technologies and majority of data revenue for CDMA is derived from dongles which are primarily used with PC's /Laptops, there will be a declining data revenue for CDMA operators in the coming years.



11.3. CDMA handsets prices are relatively more expensive.

11.4. Given the much relative global scale of adoption of 800 band being small at around 3 % as compared to other popular bands ,more educated ,high computer literacy and Internet aware, potential population being the target of narrowband LTE based Data services adoption, the device ecosystem for LTE too is also unlikely to develop at the same scale as in other bands to meet the Indian market needs.

11.5. Since the user equipment is going to be more costly, the acceptance of Service in this band is bound to be relatively of low scale and also outlook for the same does not see a scope of improving in the near future. Hence this band should be priced much lower.

12. **Also , it is envisaged that any new technology that is proposed to be deployed using this band too is bound to be plagued by similar, very restricted eco-system challenges as echoed by leading vendor community of Qualcomm, Ericsson, ALU etc .Hence the Pricing of 800 band should be much lower .**

13. **Contiguous Spectrum.** The network loading efficiency gets reduced, for any Mobile Broadband service when noncontiguous spectrum i.e. less than 5 MHz is made available, thereby leading to Techno-Commercial un-viability. Based on the knowledge of spectrum availability in India, it is our understanding that, getting 5 MHz of contiguous spectrum, in this band, shall be difficult. Given this situation, **using non-contiguous spectrum for any future wireless technologies like 4G, in a liberalized mode of operation, for any pragmatic level of adoption is deemed to be difficult.**

14. **Complementary Frequencies.** 1800MHz and 900 MHz being complementary can be used interchangeably and hence have a mutual naturalized expansion and growth path. On the other hand, 800 MHz band which is used for CDMA deployment in India is not complementary to 1800 MHz. As per a GSMA paper on “Mobile Broadband in 1800 MHz Band” dated Jul 2011, while elaborating on the usefulness of 1800 MHz band for mobile broadband service, it states that “mobile broadband services at 1800 MHz can be delivered by adapting the existing GSM base stations, removing the need for new site development, reducing operators’ costs and environmental impact.” In the paper, Deutsche Telekom is quoted as having described 1800 MHz band as “the most attractive spectrum to bring capacity to urban areas, without new site deployment, meaning minimized OPEX and minimized environmental effect.” **This is yet another endorsement of the fact that 1800 band is relatively better techno-commercial band than 800 MHz band.**

15. **Present Holding of spectrum.** Since majority subscriber base of CDMA operators belong to the lower strata of society having low budget expenditure for communication, continuance of CDMA mobile services shall be in the larger interest of this segment of the society. The present holding of spectrum of most of the CDMA operators is less than 5 MHz. In light of the earlier mentioned challenges of lack of contiguity and poor eco-system, the long term sustainability of CDMA based operations too is cloaked in uncertainty. We therefore reiterate that the pricing of the 800 MHz band should be kept reasonable so that it facilitates a level playing field and provides an opportunity for the existing CDMA subscribers to either continue with the existing services or enable migration to future technologies for better services/customer experience. We also request that **the validity of CDMA spectrum should be made 3,5,7,10,15 and 20 years as the operators may like to acquire the CDMA spectrum till the validity of their licenses because of the challenged eco-systems.**

16. **Pricing History.** Based on the responses in the auction of spectrum in 1800 MHz and 900 MHz bands, the TRAI has recommended huge reductions in the reserve price of spectrum in both these bands. Since the response in the auction of 800 MHz spectrum was more or less the same as for 1800/900 MHz spectrum bands, the TRAI should reduce the reserve price of 800 MHz spectrum in the same way to have a level playing field.

17. For ensuring active participation in the auctions, TRAI has been consistently decreasing the prices of 1800 MHz band with every subsequent auction and thus a similar practice should be followed for the 800 MHz band also. **We also recommend that no restriction should be placed for the existing licensee to participate in the upcoming auction, even if it has acquired spectrum in the recently concluded auction of March’13 for 800 MHz. licensees should be allowed to add LSA wise spectrum as per the spectrum CAP rule .**

18. In view of the foregoing, it is strongly recommended that,

- 18.1. **The value of 800 MHz spectrum should not be derived on the basis of the value of 1800 MHz spectrum using voice based technical efficiency factors as envisaged by TRAI.** They should be based on the pragmatic and logical ground realities of exploitation challenges for voices as well as data services.
- 18.2. **The application of efficiency factor of 1.3 over the valuation of 1800 MHz spectrum, for data services, would be grossly exaggerated and should not be applied.**
- 18.3. **For maintaining a level playing field, the relative value of 800/900/1800 MHz band should be maintained. Considering TRAI's recommendations dated September 09, 2013 and subsequent reduction in the price of 1800 MHz spectrum band, the corresponding and proportionate adjustment in the price of 800 MHz spectrum band too should be effected.**
- 18.4. **Accordingly, the reserve price for 800 MHz spectrum, should be kept much lower than the already determined price of 1800 MHz during the auctions held earlier, or at the most it should be pegged at 0.65 times the latest 1800 MHz reserve price as this ratio between 800 MHz and 1800 MHz was decided by the Union Cabinet earlier.**
- 18.5. **No restriction should be placed for the existing licensee to participate in the upcoming auction, even if it has acquired spectrum in the recently concluded auction of March'13 for 800 MHz. Licensees should be allowed to add LSA wise spectrum as per the spectrum CAP rule.**

Q.5. Should the value to be paid for 800 MHz spectrum be based upon the potential growth in data services? If yes, please state whether you agree with the assumptions made.

RCom Comments:

1. **We strongly disagree with the TRAI's proposal/ view** that internationally 800 MHz (800 MHz for India) band is the prominent LTE band with impressive device eco-system and that the valuation for the 800 MHz band to be based upon **potential growth in data services.**

TRAI's model to derive valuation of 800 MHz band on the basis of potential of data growth, using this band, seems hypothetical:

2. TRAI in the Present consultation Paper has envisaged a model for valuation of spectrum in 800 MHz based on potential growth of data in this band. Leading to the assumption that there will be 25% revenue from data services over the next 20 years. **We do not agree with the various assumptions of the said model because of the reasons stated below:**
 - 2.1. **Data Services Adoption.** There is no possibility of the share of data revenue from 800 MHz band remaining 25% of total data revenues for the next 20 years. This assumption of TRAI is complete fallacy. At present the share of data revenue from 800 MHz band is 25% only because, the data services in other bands are at nascent stage and with the deployment of LTE in 1800/2300 MHz, HSPA in 900 MHz and future auction of 700 MHz

and 2500 MHz, the share of data revenue from 800 MHz is likely to go down. Moreover, the quantum of spectrum available in various bands as given below and compared to just availability of just 2x20 MHz of spectrum in 800 MHz band, the availability of spectrum in other bands for potential use for data services is much higher.

Sr. No	Band	Spectrum available (paired)
1	800 MHz	20
2	900 MHz	20
3	1800 MHz	55
4	2100 MHz	20
5	2300/2500 MHz	60

Table above shows that the spectrum availability in 800 MHz band in India is in the ratio of 1:7 compared to the other bands viz. 900/1800/2100/2300/2500 MHz. Thus, the relative data revenues in 800 MHz band will be comparatively smaller and cannot be assumed as 25% of the total data revenue. With the further availability of spectrum in these as well as other bands, this ratio is likely to go down in future as more and more data services will be available in these bands. **The correct assumption of data revenue on 800 MHz would be around 4-5%.**

- 2.2. It is also brought out that even after deployment of 3G services, by majority of the GSM players; the data service revenue is only approx. 8% of the total revenue from wireless services. As compared to the global figure of 34% (approx.) 3G users, in India the adoption of these services have been less significant to approx 6% only. In fact, the ground reality, after one of the GSM players has deployed 4G services in some areas, reveals that the uptake for 4G services has failed miserably. **Therefore, it is wrong to presume and conclude that 800 band pricing should be heavily driven by Data Usage.**
- 2.3. **Revenue Potential (800 MHz band).** CDMA technology is going through a challenging/tough phase of poor adoptability, low ARPU and declining MoU year on year. Thus, the need of the hour is to give impetus to CDMA operators which are serving significant portion of wireless subscribers in the Country. As per statistics available in TRAI's June 2013 PMR report, the voice ARPU of CDMA subscribers is almost 20% less than the ARPU of GSM subscribers. Additionally, MoUs per subscriber for CDMA are about 278 minutes compared to 388 minutes for the GSM subscribers. As per TRAI's own data usage report of August 2013, quoted in the consultation paper as well, even the data usage using CDMA technology is 2/3 of that of 3G (WCDMA / HSPA) technology. TRAI has also stated that the CDMA operators hold approximately 25% share of the wireless revenue from data services. However, considering the total data usage of the wireless industry being 8%, the effective data revenue of CDMA operators contributes only 2% (i.e.25% of 8%) to the total wireless revenue of the mobile industry.

- 2.4. **Challenged Eco-system.** Based on the issues highlighted in our response to earlier questions, we are of the opinion that TRAI, while proposing the said model, has ignored the verity that the eco-system for 800 MHz band is not very conducive for deployment of advanced technologies. Important issues like poor availability of handset/network, very limited roaming facility, non-harmonized nature of this band seem to have been overlooked. Considering the above stated facts for lack of uptake of CDMA based services, **it is highly likely that any deployment of 4G based networks in the 800 MHz band will also face similar challenges of poor ecosystem, lack of devices and network availability.**
- 2.5. **Non-contiguous availability of spectrum.** It may be noted that for 800 MHz spectrum to be used effectively in the liberalized mode of operation and to be techno commercially feasible, it is imperative to meet the primary prerequisite of having 5 MHz of contiguous bandwidth as else the spectral efficiency reduces significantly by 75%. However, as per our knowledge of present availability of spectrum in 800MHz, contiguous spectrum is not available. This will surely have implications on deployment of advanced technology 4G networks, impacting its usage in a competitive mode with other popular bands like 900 MHz and 1800 MHz. **Indian CDMA band of 800 MHz is no doubt a band suitable for migration in near future for use in 4G mode of operation, however it is not suitable and compatible for liberalized usage till contiguous slots are available. Also, 10 MHz slots are not possible for use in this band as is possible in 1800 band.**
- 2.6. **Wireless is not the only mean to proliferate data services:** One cannot ignore the fact that wireless technologies are not the only mode of internet/data services in the country. Due to the physical limitations, wireless services can offer limited data throughput capabilities and hence the heavy data users today prefer fixed Landline or lease line connection compared to wireless technologies like 3G/4G. With the advent of the concept like Fiber to home (FTTH), there will be significant increase in data usage on landline based services. Thus, calculating valuation of 800 MHz on account of data services growth will not give the correct picture.

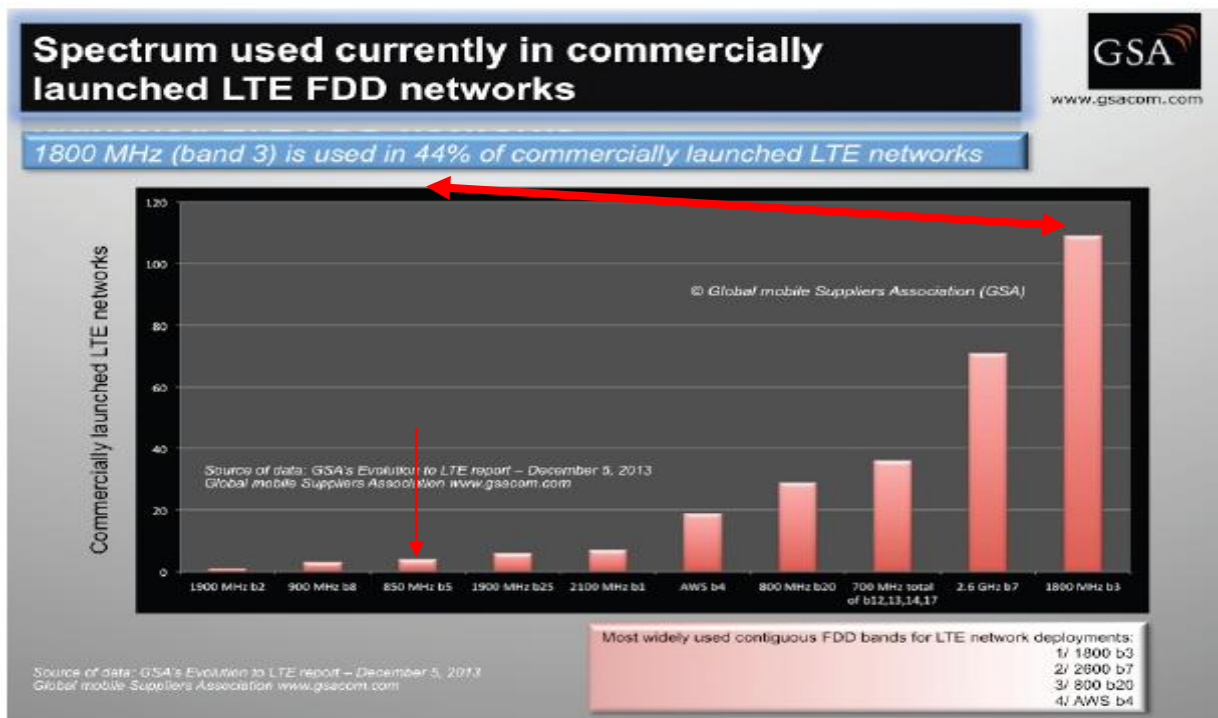
Outlook for 800 MHz (Band 5) and Global Scenario

3. **Further, international data on presently deployed 2G / 3G networks and networks planned to be deployed with futuristic technologies like 4G, clearly shows that adoption of 800 MHz band is marginal.** While there is no denying the fact that the data revenue growth worldwide is remarkable, **however it may be noted that the relative growth of data networks in the 800 MHz (Band 5) is poor/miniscule.** We request TRAI to appreciate the following facts, regarding global adoptability of 800 MHz band, before arriving at any conclusion for valuation of this band on the rationale of potential growth in data services.

Global Scenario for 4G adoption:

4. Globally, only few countries like Puerto Rico, USA (Sprint), Philippines, South Korea(2 networks), Australia have deployed advanced technologies like LTE in the 800 MHz (Band 5) spectrum band. On the other hand 1800MHz spectrum band is witnessing a mushrooming of LTE networks and is emerging as the preferred band for the same.

5. The latest data available on GSA website, on networks deployed in various bands and even used in the current consultation paper, clearly shows that **globally 1800 MHz is used in 44% of the commercial launched LTE networks and 800 MHz (Band 5) is not the preferred band for LTE deployment in future.**



6. As per the latest 4G deployment status available on **4gamericas websites**, out of the total 252 LTE networks deployed worldwide, there are only 6 countries wherein LTE has been in service in 800 MHz band. Additionally, out of a total 318 planned LTE networks, there are only 6 countries viz, Argentina (Arsat), Bahamas (Batelco), Belize (BTL), Bermuda (Cellone), Brazil (CTBC& Algar), Ukraine (ITC) where LTE networks are being planned to be deployed in 800 MHz band 5.

Zone	Total LTE networks (In service)	Total LTE Network (planned)	LTE Network in 800MHz Band (Band 5) (In service and Planned)
Asia pacific	42	88	4
Eastern Europe	39	68	1
Africa	17	50	0
Middle east	18	5	0
western Europe	62	33	0
North America	42	27	1
Latin America	32	47	6
Total	252	318	12

Source: 4gamericas.org as of January 05, 2014

Table above shows that LTE adoptability in 800 MHz is limited as compared to other bands.

7. **Device Availability:** Table 2.8 of the consultation paper also justifies the fact that the availability of devices in 800 MHz is much lower than other preferred bands for LTE deployment. In fact, device availability in 800 MHz (189 devices) is less than twice the device availability in 1800 MHz band (412 devices). Hence it is evident that **800 MHz spectrum has a poor adoptability for LTE services, and therefore any valuation of spectrum in 800 MHz band in India on the basis of future 4G deployments and relative data growth in this band shall be incorrect to say the least.**

Global Scenario for 3G (UMTS) adoption:

8. As regards adoptability of 800 MHz band for worldwide deployment of 3G (UMTS) networks are much less in numbers when compared to the widely accepted 900/2100 MHz dual band. Thus, 3G ecosystem/device availability is likely to remain better in 900 MHz/2100 MHz than 800 MHz band. **Therefore, TRAI's viewpoint that 800 MHz is an efficient band and has more data growth potential in the future, by deployment of 3G/4G technologies based services is ill-conceived and premature.**
9. Significant reduction in the reserve price of 1800 MHz, over the last auction of November '12 and March 13, has been effected for the auctions to be held in Feb'14. Naturally, justice mandates that a similar, if not more, scale of reduction should be applied while ascertaining the price for the 800 MHz band. This shall also be in consonance with TRAI's stated position in its recommendations of September'13. **In all fairness, it is the bounden duty of TRAI to ensure a level playing field amongst Telecom Service providers for protecting their long term business interests by arriving at a lower reserve price for 800 MHz band.**
10. In view of the foregoing, 800 MHz band is the band that is having the least possibility for deployment of high speed data technologies in India. In our informed opinion therefore,
 - 10.1. **We vehemently oppose its being considered for as a potential band for growth of data services.**
 - 10.2. **Any assumption / methodology to calculate valuation of this band on just potential growth in data services, especially in India, would be grossly off the mark.**
 - 10.3. **TRAI is once again requested for recommending a lower Reserve Price for the 800 MHz band than that of the 1800 MHz band.**
 - 10.4. **The reserve price for 800 MHz spectrum, should be kept much lower than the already determined price of 1800 MHz during the auctions held earlier, or at the most it should be pegged at 0.65 times the latest 1800 MHz reserve price as this ratio between 800 MHz and 1800 MHz was decided by the Union Cabinet earlier.**

Q.6. Should the value of spectrum in the 800 MHz band be assessed on the basis of producer surplus on account of additional spectrum? If you are in the favour of this method, please furnish the detailed calculations and relevant data along with results.

RCom comments:

1. **We are not in agreement with TRAI's contention that the 'Producer Surplus' model, based on account of additional spectrum should be a deciding factor for the value of 800 MHz spectrum.**
2. The 'Producer Surplus' model calculates the value of additional spectrum as the difference between the total cost of BTS and spectrum usage charge (SUC) being accrued on account of acquiring additional spectrum based on the hypothesis that more spectrum obviates the need for expenditure on installation of additional BTSs. However, in today's scenario, given the fact that the BTS, backhaul and even the power infrastructure is a shared commodity, the logic of savings on account of network expansion by adding spectrum is firstly, limited to RAN electronic equipments and secondly, is equally applicable for all the spectrum bands. Hence, **it is submitted that the contention that 800 MHz spectrum shall accrue any advantage on account of 'Producer Surplus' is unjustified.**
3. We also understand that producer surplus is relevant to voice services only as it assumes the value of spectrum vis a vis requirement of BTSs to be installed. However, in the mixed environment of voice and data services, the characteristics data points (voice and data usage) required to determine producer surplus are not available.
4. Additionally, it is brought out that the emphasis, in most of the sections of the consultation paper, is on utilization of 800 MHz band for provisioning data services. As brought out earlier in our response to questions 3 and 4, 800 MHz band is not ideal for deployment of LTE. CDMA being a 3GPP2 technology, unlike GSM and UMTS which are 3GPP technologies, does not have a natural progression path in LTE. Moreover, for accruing the benefits of LTE in terms of higher throughputs, the inherent advantage of larger cell size establishment, that 800 MHz band provides, also gets nullified. Hence, **the number of cell sites shall remain the same there by it cannot construe any 'Producer Surplus' concept application for data as well.**
5. In view of the above, it is recommended that,
 - 5.1. **The valuation of spectrum in 800 MHz band should not be based on the vintage premise of 'Producer Surplus' as per voice based services as the revenue earning capacity of the 800 MHz spectrum precludes creation of any 'Produce Surplus' for the CDMA operators.**
 - 5.2. **At best it is suggested that a techno-commercial model like DCF should be adapted for determining the pricing for the 800 MHz band.**

Q.7. Should the value of spectrum in the LSAs in India for 800 MHz be determined by utilizing the data on international prices? What other variables do you suggest for arriving at robust value estimates using the multiple regression approach? Is there any alternate approach for valuation of spectrum in 800 MHz using the data on international auctions?

RCom Comments:

1. **The value of spectrum in 800 MHz in India cannot be based on the international prices.**
2. As elucidated earlier in our response to various questions, 800 MHz band in India is plagued by numerous pitfalls which prevent creation of an effective business case for showcasing its growth path by deploying high speed data services using this band. The challenges enumerated earlier are summarized and reiterated as follows,
 - 2.1. Challenged eco-system for user and network equipment.
 - 2.2. Availability of non-contiguous spectrum.
 - 2.3. Narrow total Bandwidth.
 - 2.4. Diminishing vendor support base and Limited Adoption outlook in future for 4G.
 - 2.5. Low scale of International harmonization of this band for CDMA and LTE.
3. **Even TRAI in its recommendation on spectrum valuation and reserve price dated Sep 09, 2013 has clearly stated that the spectrum valuation in India cannot be based on international determined prices.** TRAI had itself opined that factors like ARPU, Population, Economic Development, etc. determine the valuation of spectrum and as such Indian conditions are not comparable with other countries. **Para 4.34 & 4.35 of TRAI's recommendations dated Sep 09, 2013 are reproduced below for reference please.**

Quote:

"4.34 Spectrum price in India cannot be derived directly from international prices, but can only be used as a "sense check" on the value of spectrum assessed by other approaches. The Authority further observed that factors (i.e. ARPU, population, economic development etc.) that could determine spectrum price in India are not comparable with sample countries covered by the stakeholders in their analysis. India is a low-ARPU high-subscriber market. The size of the market is large, yielding higher revenues even though ARPU is low. Most of the sample countries are developed nations and the revenue model is quite different from that of India. For instance, the share of revenue from data services is 2 to 4 times higher than in India."

"4.35 In the light of the above, the Authority is of the view that valuation of spectrum in India cannot be done on the basis of international prices."

4. Moreover, international precedence of 14 countries used by TRAI in the current consultation (para 3.34) are not corresponding to the CDMA spectrum band as used in India.
5. **In view of the foregoing, TRAI is requested to,**
 - 5.1. **Persist with its wisdom of continuing with its earlier stand of not using international pricing examples for determining the valuation of spectrum in India.**

5.2. The reserve price for 800 MHz spectrum, should be kept much lower than the already determined price of 1800 MHz during the auctions held earlier or at the most it should be pegged at 0.65 times the latest 1800 MHz reserve price as this ratio between 800 MHz and 1800 MHz was decided by the Union Cabinet earlier.

Q.8. Apart from the approaches discussed in the paper, is there any alternate approach for valuation of spectrum in 800 MHz that you would suggest? Please support your answer with detailed data and methodology.

RCom Comments:

We suggest techno-commercial model viz. **Discounted Cash Flow (DCF)** to calculate the reserve price of spectrum in 800 MHz band.

DCF approach seeks to calculate the maximum price an operator would be willing to pay for spectrum after factoring for all the costs and a targeted return, is a more comprehensive approach for valuing spectrum. Revenue and cost parameters are estimated for a pragmatic, average operator, having a fair share of the market. The price of spectrum is computed after evaluating the economic, engineering and commercial aspects in offering cellular services in the country with a given quantum of spectrum in a particular frequency band.

We have also done an extensive analysis based on different models for calculation of reserve price of 800 MHz band, based on the assumptions as given below and would be willing to share/present the same with the Authority, whenever the opportunity is provided to do so.

1. Discounted Cash Flow (DCF) Method

- A pragmatic operator in the Indian market and evaluated the economic, engineering and commercial aspects for the same in offering cellular services in the country with a given quantum of spectrum in a particular frequency band.
- Different spectrum holding scenarios have been considered to evaluate spectrum price in a technology neutral situation.
- Fair share of the market based on the number of operators present in the market for the technology under consideration.
- Business model developed taking into account revenue parameters as well as all costs in running a cellular business
- A targeted project IRR is used to arrive at the spectrum price.

2. Efforts have also been made to look at other models like producer surplus and regression analysis.

Q9. What should be the ratio adopted between the reserve price for the auction and the valuation of the spectrum? Would it be optimal to fix the reserve price equal to valuation of spectrum.

RCom Comments:

1. RCom in its response to TRAI Consultation paper on valuation and reserve price of spectrum dated July 23, 2013 had submitted that the ratio of reserve price to the value of spectrum should be set at 100%. This was based on the fact that the price of 1800 MHz was already determined in Nov'12 auction and RCom requested the Authority that the reserve price in those circle has to be the last winning price of Nov'12 i.e. 100% of the value of the spectrum.
2. TRAI in its recommendations on valuation and reserve price of spectrum dated April '12 and September 09, 2013 recommended the reserve price to be 80% of the valuation of spectrum in respective band.
3. **In light of the above, we request Authority to maintain its earlier stand and the ratio between reserve price of 800 MHz and valuation of spectrum for 800 MHz should be kept at 80%.**
