



**Telenor (India) Communications Pvt. Ltd.**  
(Erstwhile Telewings Communications Services Pvt. Ltd.)  
The Masterpiece, Plot No. 10, Golf Course Road, Sector 54,  
DLF Phase-V, Gurgaon, Haryana-122 002.  
[www.telenor.in](http://www.telenor.in)

T: +91-124-3329000  
F: +91-124-3329996

21 December 2015

**Shri Sanjeev Banzal**  
**Advisor (Network, Spectrum & Licensing)**  
**Telecom Regulatory Authority of India**  
**Mahanagar Doorsanchar Bhawan**  
**Jawahar Lal Nehru Marg**  
**New Delhi 110002**

**Subject: Consultation Paper on Valuation and Reserve Price of Spectrum in 700, 800, 900, 1800, 2100, 2300 and 2500 MHz Bands**

Dear Sir,

This is with reference to the above referred TRAI consultation paper No.6/2015 dated 26<sup>th</sup> November 2015. In this regard, please find enclosed herewith our response to the consultation paper as an Annexure.

We hope that the TRAI will find our response useful and consider our inputs while formulating the regulation on the subject.

Thanking you,

Yours sincerely,  
For **Telenor (India) Communications Private Limited**

A handwritten signature in blue ink, appearing to read 'P. K. Sharma'.

**(Pankaj Sharma)**  
Sr. Vice President and  
Head Corporate Affairs

Encl: a.a

**Registered Office:**  
Unit No. 902, 9th floor, Le Meridian,  
Commercial Tower, Windsor Place, New Delhi-110001  
CIN: U64200DL2012PTC231991

**Telenor (India) Response**  
**on**  
**TRAI Consultation paper - “Valuation and Reserve Price of Spectrum in 700, 800, 900, 1800, 2100, 2300, 2500 MHz bands (No. 6/2015)**

**Preamble**

At the outset, we would like to submit that this consultation is a welcome step towards enhancing transparency in the spectrum allocation policy at reasonable price and we hope that the recommendations of the Authority shall ensure level playing field for all the telecom service providers.

The paper covers familiar issues raised in the last auction processes, however it would have been made comprehensive by inclusion of **long term policy issues viz. spectrum roadmap, fixation of SUC for new bands 700/2500, migration to flat SUC, harmonisation of bands 1800/800 etc.**

Telenor as a foreign investor committed to the Indian telecom growth story looks forward to long term policy stability across auctions. The principles for block size, minimum number for blocks, rollout obligation, band cap, overall cap, valuation methodology etc. have been arrived at through public consultation and have been tested in five auctions held since Y2010. Frequent changes in policy may best be avoided to attract long term investments in the sector. Efforts should be made to further reduce/ eliminate arbitrage opportunities across bands/ auctions/ policies. An exception created (viz. auction of 4.4 MHz, 3.75 MHz) due to particular circumstances should phase out with the end of that particular auction.

**Introduction of new bands (700 / 2500)**

**700 Band:** Being a sub- 1GHz, there are inherent benefits of this band - it provides better cellular penetration (i.e. in-building reception) and coverage with fewer deployed cell sites. In India, APT 700 MHz in band 28 (FDD) is earmarked for allocation as a fresh contiguous block which will be instrumental in achieving “Broadband for all” NTP 2012 target in a timely manner. Presently, the APT 700 band has been allocated, committed to or recommend by 42 countries, targeting 4 billion users. Please refer below table for the global development in this band.

<b>13 Countries Licensed APT 700</b>	<b>12 commercial launches in 5 countries</b>
Australia, Argentina, Brazil, Japan, Taiwan, South Korea, Mexico, Chile, Ecuador, Fiji, New Zealand, Panama and Papua New Guinea Germany and France auction concluded in 2015	Australia, New Zealand, Taiwan, Panama and Papua New Guinea,

The device ecosystem for APT700 Band 28 is developing at a good pace. Currently, 214 devices<sup>1</sup> are available in this band globally, assuming that the auctions are concluded in Q1/ Q2 2016 and the allocations of spectrum happen by Q3/Q4 2016, Telecom Service Providers (TSPs) in India will be ready with their 700 MHz networks by mid 2017 and there will be big momentum in APT700 eco system by that time.

Fresh spectrum is being introduced majorly in 700 and 2500 bands, while three blocks in 2100 and one block in 2300 is also proposed to be auctioned. The blocks available in 2500 band (Band 41) does not have a developed eco-system (as against Band 7 and 38), hence would not find any takers. **Thus the major source of fresh spectrum is from 700 band, hence, we recommend to 2x45 MHz in this band to be put to auction.**

### **Block size and SUC for new bands (700 / 2500)**

India being a highly competitive market having 6-12 TSPs across 22 LSA, given the utility of 700 band for both rural and dense urban coverage, it is valuable for all TSPs. We recommend **block size of 2x5MHz with a ceiling of 2 blocks per TSP** so that maximum 4-5 TSPs can acquire spectrum in this coverage band.

2300 & 2500 Band: We recommend **block size of 1x10MHz** for both as these are capacity bands and are supplementary to coverage networks. The proposed block size will create opportunities to acquire spectrum by more service providers – new as well as existing TSPs present in this band. Winners with **more than one block should get contiguous spectrum.**

The spectrum usage charge (SUC) for 700 should be same as 800/900 and for 2500 same as 2300. Ideally SUC should be flat 1% of AGR across all bands to remove arbitrage and same should be charged only for recovering of administrative cost. TRAI should reiterate its earlier recommendation of charging flat fee.

### **Spectrum Cap**

The present in-band cap of 50% and overall cap of 25% is working well and should be uniformly applied in all policies namely Guidelines for M&A, spectrum sharing, spectrum trading and Auctions. Existing spectrum cap has been defined in 2012 auctions and has remained the same in subsequent auctions. All service providers have procured spectrum basis these terms defined in the NIA, now there should not be any change in the spectrum caps.

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<sup>1</sup> (Reference: [http://www.gsacom.com/downloads/pdf/GSA\\_lte\\_ecosystem\\_report\\_021115.php4](http://www.gsacom.com/downloads/pdf/GSA_lte_ecosystem_report_021115.php4)).

The spectrum cap should be computed on the basis of existing allocations + spectrum put to auction (excluding expiry spectrum if any). Any spectrum available with WPC and not put to auction should not be used for any calculation as this information is not in public domain. **Inclusion of such data will lead to speculation and market manipulation.**

Two new bands are being introduced and we recommend to follow the existing **band cap of 50% for new bands 700 and 2500** as well.

### Rollout Obligation

There are multitude of networks using 800,900,1800 and 2100 bands to serve the same population / geography. Stringent and enhanced rollout obligation has been prescribed under UL as compared to earlier regime. These rollouts at BHQ level have not been verified yet and their impact is not yet ascertained. Hence, in the scenario where spectrum is auctioned at market determined price, there is **no further requirement of rollout obligation** as the successful bidder will rollout its network in rural areas driven by market forces.

TSPs who had acquired spectrum in these auctions are still struggling to meet the obligation due to various operational challenges viz – non-availability of BHQ maps, long drawn cumbersome testing procedure, high testing fee etc. The networks have expanded beyond the mandated BHQ, but struggling for verification by Licensing field units, thus constantly staring at liquidated damages. The consistency in existing policy of rollout obligation should be continued and any changes as suggested in this consultation paper are not desirable.

The Population based coverage may not be an efficient way to cover villages – as currently, more than 40%<sup>2</sup> of Indian rural population lives in sub 2000 population villages. It cannot be assumed that more than 1-2 service providers to cover the same. Given that TSPs now acquire spectrum on market price, should there be roll out obligations et all on them – its double whammy in absence of any incentives.

For faster rollout of networks in villages/ rural areas, in our opinion, rural rollout needs to be encouraged through **provisions of incentives** which may be reviewed periodically through public consultation and followed by course correction annually. One of the suggestions is that Government should invest in Capex and build passive infrastructure (tower, shelter, fibre) in unconnected villages/ rural areas with the funding from the unutilized USO fund. This should be offered to all service providers on rent free basis to deploy electronics.

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<sup>2</sup> (Reference:<https://data.gov.in/catalog/villages-population-size-class>).

Even after completion of 20 years in a 6-8 player market, there has been no financial viability to build infrastructure on a standalone basis in hinterlands of rural India. This incentive shall make the deployment viable.

For the new 700 band, **specific rural rollout may be attached to one block of 5Mhz in 700 band** with reserve price of this block set at 25% of reserve price set for other blocks.

2300 MHz and 2500 MHz bands are purely a capacity band and require high deployment cost if these are to be used for coverage. Therefore, **for fresh spectrum acquired in these high frequency bands, rollout obligation is not required.**

### **Spectrum Valuation and Reserve prices**

The spectrum assignments through auctions should be done in such a manner that the bidding process leads to market-clearing prices leaving no spectrum unsold. Too high reserve prices will prevent market clearing prices from being discovered, and lead to unsold spectrum.

It is fair to assume that an Auction Discovered Price is a benchmark for (marginal) spectrum value. Where spectrum remained unsold, there is no Auction Discovered Price. In the instances of business continuity risks as seen in 2014, 15 auctions, such prices cannot be termed marginal.

Predicting spectrum value is difficult. Previous attempts to estimate spectrum value holds little merit, and has proven an inefficient method of setting appropriate reserve prices for auction, as spectrum either remained unsold or was sold at prices way beyond estimates. **Government should therefore rather base forward-looking reserve prices on observed market clearing price points from previous auctions where available** (reserve price should be 20-40% below these prices to allow for price discovery). When such price points are not available, reserve prices should be substantially reduced compared to previous auctions (40-60% below previous reserve prices), and could potentially be further guided and “sanity checked” by international benchmarks (appropriately adjusted for population, ARPU, GDP/capita, licence duration as needed).

Considering the fact that this auction is for fresh spectrum in 700, 2100, 2300 and 2500 MHz band, it would be appropriate that the **Government set the reserve price at low level (as suggested in above para) and let market forces to take it forward the prices basis individual TSP’s requirement of spectrum and business model.** Setting reserve prices involves one-sided risk. If reserve prices are set below value, the 2014 and 2015 auctions showed that competition will drive prices up to the market clearing level. Too high reserve prices, however, will not

trigger a downward pressure on prices, but rather leave spectrum unsold. Therefore the main objective should be to avoid reserve prices that are too high.

Setting reserve prices close to historical Auction Discovered Prices involves a significant risk of unsold spectrum and a loss to the exchequer. Spectrum prices in India are among the highest in the world. At Auction Discovered Prices the cost of the spectrum proposed offered for sale by Government is ~5.0 trillion INR<sup>3</sup>, or more than three times reported total revenues in the industry in last four quarters which is ~5.6 trillion INR<sup>4</sup>. This does not include spectrum that will become available over time in India. Since 2010 the industry has paid aggregate 2.6 trillion INR<sup>5</sup> for spectrum. **The current spectrum price level is therefore a significant burden to the industry.**

The intense competition in the 900 MHz band in the March 2015 auction reflected that many bidders were in a “must win” situation, since renewal was required to maintain 2G services. Although 800 MHz spectrum prices increased significantly in 8 (out of 20) Licences Service Areas (LSA), spectrum remained either unsold or sold at prices close to the reserve price in 12 LSAs. The results in the 1800 MHz band are comparable with the 800 MHz band. **To avoid unsold spectrum, reserve prices in these bands in the upcoming auction should therefore be set well below Auction Discovered Prices.**

In the 2100 MHz band, fresh spectrum was put up for sale in 2015. Except for Assam and North East, reserve prices exceeded the *maximum* of 1800 MHz (2014) and 2100 MHz (2010) Auction Discovered Prices. As a consequence spectrum in:

- 3 (out of 17) LSAs remained unsold;
- 4 LSAs received only a single bid;
- In 7 LSAs the final price was close to the reserve.

Spectrum was sold at a price significantly higher than the reserve in 3 LSAs only.

Telenor (India) welcomes the Government’s intention to put fresh (and unsold) 2100 MHz spectrum up for sale in a new auction. If the Government has a real intention to sell the spectrum, reserve prices need to be reduced significantly compared to the 2015 auction. Otherwise there is a significant risk that valuable spectrum remains unsold:

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<sup>3</sup> Assumptions: 2x35 MHz in 700 MHz band pan India; 800 MHz as per Table 2.4; 900 MHz as per Table 2.7; 1800 MHz as per Table 2.9; 2100 MHz as per Table 2.12; 2300 MHz as per Table 2.13; 2500 MHz as per Table 2.14. Where available the most recent auction discovered price is deployed. 4x the 1800 MHz prices are used as a reference for the 700 MHz spectrum, while the 2300 MHz Auction Discovered Prices in 2010 are used as a reference for the 2500 MHz band.

<sup>4</sup> TRAI AGR reports for the period - Sep’15 to Sep’15 which is INR 188636.7743 Crs.

<sup>5</sup> Excluding spectrum acquired by BSNL/MTNL

- In 3 LSAs (with unsold spectrum), 2015-reserve prices have already proven to be excessive;
- In LSAs where spectrum was sold, demand is now reduced by 2x5 MHz;
- With additional 2x15-2x20 MHz for sale the market clearing price will be lower.

The **valuation of 2300 MHz band should be done afresh** instead of using 2010 auction discovered prices. The 2300 MHz band is inferior to 2100, 1800, 900 and 800 MHz bands, both with respect to geographical and indoor coverage. Terminal penetration is also significantly lower for the 2300 MHz band. Moreover, this band is being considered as capacity band and it is likely to be used along with other bands to supplement the capacity requirements in dense urban and urban areas to offset the high deployment cost.

There exists no Auction Discovered Prices for the 700 MHz and 2500 MHz bands. Using 900 MHz prices or 4 times 1800 MHz prices as a reference for the 700 MHz band is equivalent to constraining supply and would, for the reasons described above, with high likelihood lead to unsold spectrum.

**Reserve prices for the 2500 MHz band should be set below reserve prices (50%-60%) of the 2300 MHz band, reflecting inferior propagation characteristics and the fact that the 2500 MHz spectrum is not applicable for the band plan with the best ecosystem.**

### **Spectrum Harmonisation in 1800 Band**

The Government had started the exercise of harmonization 1800 band in May 2015. Although all service providers have committed to this initiative, the progress is slow and needs to be expedited to ensure optimal use of available spectrum in this band.

Leaving aside 1.8MHz in 10 circles under the TDSAT order and also a guard band of 0.2 MHz between liberalised and administrative spectrum, an estimated ~214.1 MHz spectrum will be available with the government in 1800 band post harmonisation including 22 MHz 2017 license expiry spectrum. Contiguous 3 blocks of 2x5MHz will be available in 4 circles (Assam, J&K, Punjab, West Bengal) 2 blocks of 2x5MHz in 7 circles (Bihar, Delhi, Gujarat, HP, Maharashtra, Rajasthan, UP-West) and 1 block of 2x5MHz in 3 circles (Haryana, NE, UP-East).

This spatially and geographically harmonised spectrum in one of the most developed LTE band is worth ~ INR 214.54 billion.

Thus, the harmonisation activity need to be completed at the earliest and the entire harmonised spectrum in this band should be included in this auction. In case it is available after in Q3-Q4 2016, there is precedence of allocation at a later date.

## Issue wise response

**Q.1. Whether the entire spectrum available with DoT in the 800 MHz band be put for auction? Justify your answer.**

**Q.2. How can the spectrum in the 800 MHz band, which is not proposed to be auctioned due to non-availability of inter-TSP guard band, be utilised.**

### Telenor (India) Response:

- There should be same treatment for all bands. Maximum spectrum can be made available for auction by doing harmonisation of 800 band as currently in progress for 1800 band.
- Similar to the principle adopted in on-going harmonisation of 1800 band, all liberalised blocks in 800 should be shifted towards lower frequency and all administrative blocks to the upper end with a guard band in between. Thus, reducing the need for many guard bands.
- By ensuring availability of more spectrum TSPs operating in different bands will have an equal and analogous preference for 800 MHz spectrum.

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

### Telenor (India) Response:

- As can be seen from the consultation paper, DoT has proposed to put 2x35 MHz out of total 2x45 MHz on the auction. Since this is a precious spectrum and will be vital for achieving the Broadband penetration targets as envisaged in the National Telecom Policy 2012, hence entire 2x45 MHz should be put for auction. We would request Authority to recommend the same to DoT.
- Although globally, 2x10 MHz block size has been put to recent auctions with 3-4 maximum number of TSPs in each market (refer below table), however India being a highly intensive competitive market having 6-12 TSPs across 22 LSA, it is suggested that the block size should be kept 2x5 MHz with a ceiling of 2 blocks per winner so that maximum 4-5 TSPs can get an opportunity to acquire spectrum in this band. This will ensure level playing field among all TSPs.

S.No.	Country Name	Block Size put to auction (Period)	# of TSPs participated in auction
01	Australia	2x10 MHz (May 2013)	02 (Optus Mobile, Telstra) out of 04 TSPs
02	Brazil	2x10 MHz	04 (Telefonica, Telmex, Telecom Italia and

		(Sep 2014)	Algar)
03	Japan	2x10 MHz (June 2012)	03 (NTT DoCoMo, KDDI and e-Mobile) out of 4 TSPs (Softbank)
04	New Zealand	2x15 MHz (June 2014)	03 (2degrees, Telecom NZ/Spark, and Vodafone)

- 2x5 MHz block is the most common and aligned with bandwidths supported in the LTE systems.
- Winners of spectrum beyond 2x5 MHz should get contiguous spectrum (e.g. a winner of 2 lots of 2x5 MHz should get one contiguous block of 2x10 MHz).
- Smaller block size of 2x5 MHz and limiting two blocks per TSP will ensure maximum revenue to the exchequer due to participation of more TSPs in compare to putting up a larger block size on the auction.

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

**Telenor (India) Response:**

- It is necessary to implement auction rules that eliminate the risk of winning less than a minimum spectrum package amount (e.g. 5 MHz), if this is unsustainable for a bidder. Telenor strongly supports auction rules that protect bidders against such risk. Therefore, the existing auction rules should be modified in a manner that allow bidders to decide for themselves whether there is a minimum amount of spectrum that could be won or not (equivalent to bidder deciding whether to be 'new entrant' or 'existing licensee') and bidder shall be able to set this minimum quantum of spectrum individually across LSAs and Bands.
- For a new entrant, without any spectrum in any band, a rule that guarantees a minimum package (if winning) is of critical importance. But also incumbent licensees may benefit from such a rule if the spectrum acquired is planned used for a particular technology (e.g. 3G, 4G) that requires a minimum amount of (contiguous) spectrum. The minimum required amount could therefore differ among bidders, but also across bands and LSA.
- Such rule will not only promote participation and competition but will also ensure that no spectrum will be left unsold.

In view of above submission, we recommend:

- All bidders should have the flexibility to choose whether to have status as a “new entrant” or an “existing licensee”.
- Rather than pre-defining the bidder’s status as “new entrant” or existing licensee” in a band, the bidder should have the flexibility to choose its own status, i.e. a bidder is able to decide the minimum quantum of spectrum required to bid for. It should be straight-forward to implement this in the auction system. As an illustration, in the latest 900 MHz auction in Bihar, Reliance Telecom was outbid by Bharti Airtel. Reliance Telecom could not win less than 2x5 MHz (as a new entrant). 2x4.6 MHz of spectrum therefore remained unsold. With the suggested flexibility this could have been avoided.
- Similarly, the bid for 5 MHz can be assigned priority over the bid for partial spectrum. For instance, if two operators A & B bid for 5 MHz and 1 MHz spectrum respectively on the same price, the auction rules should be framed in such a manner that priority ranking for allocation of spectrum should be given to operators A who has bid for 5MHz spectrum instead of operators B who need only 1 MHz spectrum. This will ensure optimal spectral efficiency by ensuring allocation of contiguous blocks of 5MHz for 4G.

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

##### **Telenor (India) Response:**

Telenor recommends block size of 1x10MHz for both 2300 and 2500 bands. It will allow more winners and the most efficient outcome. However, winners with more than one block should get contiguous spectrum (e.g. a winner of 2 lots of 10 MHz should get one contiguous block of 20 MHz). Following are the reasons in support of the above recommendation:

- These bands are recognised as capacity bands and will supplement existing coverage for a meaningful deployment, thus smaller block size will be useful for the TSPs.
- 10 MHz of TDD spectrum is fairly similar (for 4G) to the block size of 2x5 MHz in FDD spectrum.
- Spectrum holdings in the 2300 bands are usually fairly large; 20, 30, 50 or even 100 MHz. There could be historical reasons for this (the spectrum has historically not be considered valuable, there is a lot of guard bands in the license etc.), but guard bands can be done away by ensuring synchronization of the TDD networks.
- In UK, OfCom has chosen lots of 10 MHz in its upcoming 2300 MHz band auction. (*Reference: Info-memorandum dated 26Oct 2015 published on OfCom website*)

- Some of the countries (Hongkong, Japan, Oman etc) have also adopted 10 MHz TDD channel bandwidth.
- The smaller block size will also ensure higher revenue for exchequer and accommodate more number of TSPs.

**Q6. Considering the fact that one more sub-1 GHz band (i.e. 700 MHz band) is being put to auction, is there a need to modify the provisions of spectrum cap within a band?**

**Telenor (India) Response:**

- We recommend that **there should not be any change in the existing provisions of spectrum caps – In-band cap of 50% & All band cap of 25%.**
- Spectrum cap has been defined in the year 2012 auction and remain the same for subsequent auctions, all TSPs have procured spectrum basis these terms defined in the NIA.
- The current in-band cap of 50% has effectively served the interest of consumer, competition and the Industry. It not only avoids spectrum concentration in a particular band with a single TSP but also enables others to acquire adequate/proportionate spectrum in the same band. On the contrary, the proposal of a separate cap for Sub-1 GHz bands in a market of 6-8 TSPs will allow a single TSP to acquire an excessive/disproportionate amount of spectrum in a **particular band say >15MHz out of 35Mhz in 700 band** which may lead to competitive disadvantage for other TSPs, thereby creating its monopoly/dominance over the spectrum in a specific band, which can be best avoided by Regulators.

**Q7. Is there any need to specify a separate spectrum cap exclusively for the spectrum in 700 MHz band?**

**Telenor (India) Response:**

- No, there is a no need to specify a separate spectrum cap for 700 band for ensuring level playing field across bands. There should be same treatment of all bands and no arbitrage may be introduced across bands/auctions/policies.
- The existing in-band cap of 50% may be extended to newly introduced 700 band.
- Similar to the auction specific limit prescribed in 3G auctions, there should be a **limit of 2 blocks of 2x5 MHz per winning bidder** in the newly introduced 700 band.

- As explained in the Preamble, above exception should end with the conclusion of this auction.

**Q8. Should a cap on the spectrum holding within all bands in sub-1 GHz frequencies be specified? And in such a case, should the existing provision of band specific cap (50% of total spectrum assigned in a band) be done away with?**

**Telenor (India) Response:**

- No, the in-band cap is working well and it should be uniform across all bands 700/800/900/1800/2100/2300/2500. We have explained our position while responding to Q6 & Q7, spectrum caps issue was also publicly debated in the month of June-July 2015 while responding to the reference from Hon'ble Supreme Court.
- As an illustration, 1800 band has 176 licensees across circles. Out of which 3 Licensees has crossed 50% limit and 13 & 11 licensees are holding spectrum between 40% to 50% and 30% to 40% limit of current defined spectrum cap respectively. This clearly depicts that the > 98% Licensees existing holdings in 1800 band has not yet even crossed 50% limit and 87% Licensees are well below 40% of the defined cap therefore the question of exceeding the cap for any TSP doesn't arise in near future.
- There is no need to do away with the 50% cap for 700, in fact an auction specific exception should be prescribed so that any winning bidder is limited to 2 blocks of 2x5MHz, very similar to the exception defined in 2010 for 3G blocks.
- Since all in-band spectrum caps are independent to each other hence there will be no impact of in-band spectrum cap after introducing the 700 MHz band.

**Q.9. Should 2300 MHz and 2500 MHz bands be treated as same band for the purpose of imposing intra-band Spectrum Cap?**

**Telenor (India) Response:**

No, 2500 and 2300 band are different bands and should be treated separately for imposing in-band cap due to the following reasons:

- Both the bands are at different stage of the development globally in terms of device eco system - 1021 devices in B40 of 2300 Vis-a-vis 769 devices in B41 of 2600 (*source – GSA*)

- The propagation characteristics are not similar between these bands. Refer below table depicting cell range and coverage area parameters offered by these bands.

	UL Cell Range (Km)		Coverage Area (Km <sup>2</sup> )	
	2300 MHz	2600 MHz	2300 MHz	2500 MHz
<b>Dense Urban</b>	0.30	0.27	0.17	0.14
<b>Urban</b>	0.51	0.45	0.50	0.40
<b>Rural</b>	3.44	3.04	23.08	18.06

Source – ZTE White paper, June 2013 available on GSMA website

### Please support your suggestions for Q6 to Q9 with proper justifications?

The response to Q6 to Q9 is 'no change in existing policy' the issue wise justification is given alongside our response. It is prudent regulatory practice that important policies like Spectrum cap should be uniformly defined across different policy documents for substitutable services.

Any change in one policy document should be correspondingly modified in all other related policy documents to prevent arbitrage across bands/auctions/policies.

Indian market is characterized by high levels of competition that result from low market concentration reflecting in lower tariffs. Any view on changing spectrum cap should be viewed from this angle of market competition.

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

#### Telenor (India) Response:

- Telenor concurs with TRAI views that 700 MHz being a lower frequency band, has the ability to support wider coverage using fewer base stations / sites and can play a significant role in improving broadband coverage in the rural and remote areas in a cost effective manner to achieve the NTP 2012 broadband target "Broadband for all".
- As mentioned by TRAI in the paper in para 2.52, duplication of network cost for coverage is undesirable and inefficient.
- In Indian context, a variant of the Swedish approach would work for mandating rollout obligation for 700 MHz band.

- It is suggested that coverage obligation should be attached to the one block of 2x5MHz in 700 band and same should be sold as a separate category. The reserve price of this block should be fixed at 25% of the reserve price set for other blocks. The winner of this block should be mandated to first provide mobile broadband service in unconnected villages in a time bound manner.
- The Norwegian Government also deployed a similar approach in the 2013 auction. This requires the auction system to ensure the block with coverage obligations is sold as a separate category to the ones without, so that price discovery on the two types of blocks is independent.

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

**Telenor (India) Response:**

- As suggested in response to Q10, coverage obligation should be attached to one block of the spectrum to avoid duplicity of networks and higher deployment costs.
- Rest of the blocks which will be put for auction should be free from any mandatory coverage obligation as these blocks will be sold at market price and TSPs should have the flexibility to decide in which order to provide coverage as per their business plans.

**Q.12. In the auction held in March 2015, specific roll-out obligations were mandated for the successful bidders in 800 MHz, 900 MHz, 1800 MHz and 2100 MHz spectrum bands. Stakeholders are requested to suggest:**

**(a) How the roll-out obligations be modified to enhance mobile coverage in the villages? Which of the approaches discussed in para 2.58 should be used?**

**Telenor (India) Response:**

- The rollout obligation is governed by license condition and respective NIAs along with the spectrum made available in all the last five auctions held since May 2010. The condition of rollout obligation is rigorous and mandate extensive network rollout. TSPs who had acquired spectrum in these auctions are still struggling to meet the obligation due to various operational and policy challenges. The present policy on rollout obligation should be continued and any changes as suggested in this consultation paper will distort the continuity in policy.
- These rollout obligations were part of NIA vide which we participated in spectrum auctions held in Nov 2012 and have won the spectrum for six Circles. Any change in the NIA stipulated conditions at this stage will amount to change in

terms and conditions which will have significant financial implications on us resulting in un-viability of business plans for these Circles and will directly impact funding of our expansion plans.

- Even the recommendation on additional rollout obligation given by TRAI vide its recommendations dated 09 September 2013 with the intent to ensure better mobile coverage was not viable for TSPs. As an illustration, Telenor had estimated additional 31000 BTSs along with additional financial burden of INR 31 billion CAPEX and INR 22 billion yearly OPEX across its six operational circles. These TRAI recommendations were deliberated by DOT and the Telecom Commission had decided that a comprehensive techno-economic study may be carried out to examine issues relating to increase in coverage and tele-density in rural areas while at the same time ensuring sustained quality of service and to examine the adequacy of USOF mechanism alone to achieve these objectives.
- In the present scenario where liberalised spectrum is auctioned at market determined price, there should not be any requirement of additional rollout obligation to cover unconnected rural areas/ villages as the successful bidder will rollout its network as per his business plans for a respectable ROI and ensure timely compliance of its existing rollout obligation. The existing rollout obligations are already stringent enough which ensures rollout of network in rural and remote areas and same should be considered for any additional block of spectrum acquired in this auction.
- Further, the Population based coverage may not be a efficient way to cover villages – as currently, more than 40%<sup>6</sup> of India rural population lives in sub 2000 population villages. It cannot be assumed that more than 1-2 TSPs to cover the same. Given TSPs now acquire spectrum on market price and are paying USO levy of 5% of their AGR which is mainly contributed for the rollout of network in rural and remote areas, should there be roll out obligations et all on them – its double whammy in absence of any incentives along with USOF contribution.
- For faster rollout of networks in villages/ rural areas, in our opinion, rural rollout needs to be encouraged through provisions of incentives which may be reviewed periodically through public consultation and followed by course correction. One of the suggestion is that Government should proactively build and share the rent free ready infrasturcture along with tower in unconnected villages/ rural areas with the funding from the unutilized USO fund across all TSPs on non discriminatory basis. We believe that this will act as an incentive for TSPs to put their electronics / equipments and rollout their networks as per their business case. This is also important from the perspective that even after completion of 20 years for some of the licensees in a 6-12 player market, there has been no financial viability to build infrastructure on a standalone basis in hinterlands of rural India.

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<sup>6</sup> <https://data.gov.in/catalog/villages-population-size-class>

**(b) Should there be any roll out obligation for the existing service providers who are already operating their services in these bands.**

**Please support your answer with justification?**

**Telenor (India) Response:**

- Currently, all TSPs are committed to meet the Rollout obligation as specified in the license / NIA terms & conditions and either have completed or in different stages. Thus, there is no need for any further rollout obligation for the existing service providers. Rather, Government should ensure resolution of the issues which has been raised by TSPs from time to time incl. timely availability of ROW basis restoration, BHQ maps etc. to meet the rollout obligation in a timely manner.

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

**(a) Should the same roll-out obligations which were specified during the 2010 auctions for BWA spectrum be retained for the upcoming auctions in the 2300 MHz and 2500 MHz bands? Should both these bands be treated as same band for the purpose of roll-out obligations?**

**Telenor (India) Response:**

- There are various LTE operating spectrums distributed from 700MHz to 2.6GHz, with considerations for even higher bands for some services. Fundamentally, the propagation loss attributed to different bands and the spectral coverage distances differ, even when using the same MAPL (Maximum Allowed Path Loss).
- The propagation loss of radio waves increases with the frequency. High frequency bands have a larger propagation loss. In the dense urban environment and with antenna height of 30metres, propagation loss and propagation distance curves in 2.6GHz, 2.1GHz, 1.8GHz, 900MHz & 700MHz bands are shown in below chart –

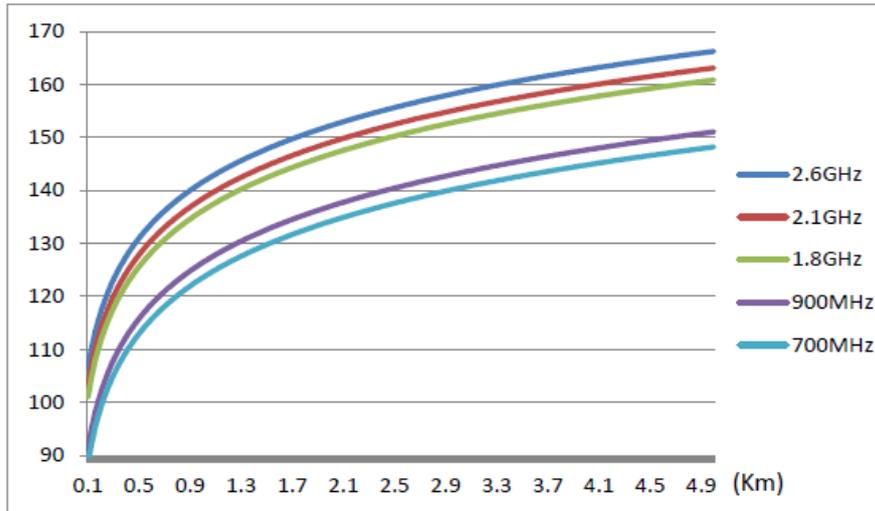


Figure: Propagation Loss & Propagation distance curve comparison in Dense Urban Areas (Source – ZTE White paper, June 2013 available on GSMA website)

For example, from the results the propagation loss of 2.6GHz at 500m is about 18dB larger than 700MHz. As another example, for the same propagation loss at 130dB, the propagation distance for 2.6GHz is about 500m, while the propagation distance for 700MHz is about 1.6Km. In this regard, Refer below table depicting coverage analysis for different low & high frequency bands.

	UL Cell Range (Km)				Coverage Area (Km <sup>2</sup> )			
	700 MHz	800 MHz	2300 MHz	2600 MHz	700 MHz	800 MHz	2300 MHz	2500 MHz
<b>Dense Urban</b>	0.70	0.63	0.30	0.27	0.95	0.78	0.17	0.14
<b>Urban</b>	1.21	1.09	0.51	0.45	2.84	2.33	0.50	0.40
<b>Semi Urban</b>	3.37	3.04	1.31	1.16	22.16	18.06	3.35	2.63
<b>Rural</b>	8.48	7.65	3.44	3.04	140.37	114.22	23.08	18.06

Source – ZTE White paper, June 2013 available on GSMA website

From the above submissions, it is established that the 2300 MHz and 2500 MHz bands are purely a capacity band and require high deployment cost if these are being used for coverage. Therefore, **for fresh spectrum, rollout obligations should be considered for low-frequency spectrum that is applicable for ensuring coverage, but is not needed for high frequency spectrum which is suited to ensure capacity** in more densely populated areas.

**(b) In case existing service providers who are already operating their services in 2300 MHz band acquire additional block of spectrum in 2300 or 2500 MHz band, should there be any additional roll out obligation imposed on them?**

**Telenor (India) Response:**

Since these set of existing TSPs are already governed by rollout obligation in NIA wherein extensive coverage requirements were specified hence no additional rollout obligation should be imposed upon acquiring additional block of spectrum.

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

**Telenor (India) Response:**

Network synchronisation should be mandated to ensure maximum spectrum utilization in 2300 MHz band. Regulator may play an active role in ensuring that there is level playing field amongst the different players. However as ratio of downlink to uplink can change over time as per different operating / business conditions, there should be review of this in a pre-defined frequency. We suggest a review period of 2 years for the same.

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

**Telenor (India) Response:**

- Government should decide synchronization of the TDD networks on a set of default parameters based on international best practise.
- Government should mandate as a minimum the following parameters:
  - The ratio of downlink versus uplink traffic (e.g. 67% downlink and 33% uplink)
  - A defined spectrum block emission mask
  - A synchronisation procedure for networks. Most TSPs use GPS for their own network synchronization. This can be utilized for overall network synchronization.
  - An identical frame structure among TSPs who must use the mandated configuration or equivalent frame structure and be compliant with the other parameters in the Inter-TSP Synchronisation Procedure.
- Adjacent TSPs could through common agreement decide to change these.
- Some of the TSPs in countries like Australia, Malaysia and China having TDD deployments have done clock synchronisation with GPS to avoid the guard band requirement in 2300 MHz band in line with global TDD 2.3 GHz release case.

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

**Telenor (India) Response:**

- No guard band is needed as long as well-defined spectrum masks are used. There exist international best practise that could be applied for this, e.g. from Europe and Asia.
- Spectrum in 2300MHz band should be harmonized with no Guard Band in between different blocks. This will make more spectrum available for the auction and subsequent deployment for Wireless Broadband.
- Example of 2300 allocation in China without any Guard band
  - ✓ China Unicom - 2300-2320 MHz,
  - ✓ China Mobile - 2320-2370 MHz,
  - ✓ China Telecom- 2370-2390 MHz

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

**Telenor (India) Response:**

- The eligibility criteria for acquiring access spectrum are defined in NIA keeping in view the long term commitment for network rollout. Same should be maintained for level playing field.
- ISPs should be brought under UL regime who would like to acquire spectrum in these bands. Guidelines for UL have provisions whereby an ISP licensee can migrate to Unified License by paying entry fee of Rs 1 Crore per service area. Cross holding clause should uniformly apply to them as well.
- In fact the ISP licensees of 2010 auctions have migrated to UL prior to launch of service, no ISP has launched commercial services using BWA spectrum.

In view of above, we recommend the following:

- No separate / differential treatment is required for these bands vis-à-vis other bands as far as eligibility conditions are concerned to participate in an auction.

- All rules and eligibility conditions applicable on other bands – 800, 900, 1800 & 2100 should be made applicable to these bands too for all the participants to ensure level playing field.
- No opportunity for arbitrage / lowering entry barrier should be created.

#### **Q.18. Stakeholder are requested to comment on**

**(a) Whether the guidelines for liberalisation of administratively allotted spectrum in 900 MHz band should be similar to what has been spelt out by the DoT for 800 and 1800 MHz band? In case of any disagreement, detailed justifications may be provided?**

##### **Telenor (India) Response:**

- It is recommended that similar liberalisation guideline which is currently applicable to 800 and 1800 MHz band should be implemented for 900 MHz band.
- This will not only ensure level playing field but creating many rules/ guidelines on similar issues will create arbitrage and act as a disincentive for investment.

**(b) Should the liberalization of spectrum in 800, 900 and 1800 MHz be made mandatory?**

##### **Telenor (India) Response:**

Yes, liberalisation of spectrum in 800, 900 and 1800 MHz band should be made mandatory due to the following reasons for ensuring level playing field among all the TSPs –

- Optimal and efficient use of allocated spectrum by deploying higher technologies: currently, ~51% of spectrum held by all TSPs is liberalised spectrum which can be used for deployment of any higher technology (3G/4G LTE) other than 2G services in these bands.
- TSPs are committed to support the Government vision of “Digital India” for enabling faster rollout of Broadband in the country. For this purpose, it is necessary that all available spectrum should be made available to deploy higher technologies.
- Higher mobile broadband penetration which will accelerate economic growth by 1.38%. This will be instrumental in achieving the target of “Broadband for all”.  
(Reference - *Broadband Highways: Driving India's Growth story, August 2014*).

**Q.19. Can the prices revealed in the March 2015 auction for 800/900/1800/2100 MHz spectrum be taken as the value of spectrum in the respective band for the forthcoming auction in the individual LSA? If yes, would it be appropriate to index it for the time gap (even if this is less than one year) between the auction held in March 2015 and the next round of auction and what rate should be adopted for indexation?**

**Q20. If the answer to Q.19 is negative, should the valuation for respective bands be estimated on the basis of various valuation approaches/methodologies adopted by the Authority (as given in Annexure 3.1) in its Recommendations issued since 2013 including those bands (in a LSA) for which no bids were received or spectrum was not offered for auction?**

**Q30. Should the realized prices in the recent March 2015 auction for 800/900/1800/2100 MHz spectrum bands be taken as the reserve price in respective spectrum bands for the forthcoming auction? If yes, would it be appropriate to index it for the time gap (even if less than one year) between the auction held in March 2015 and the forthcoming auction? If yes, then at which rate the indexation should be done?**

**Telenor (India) Response:**

- Since 2010, five auctions have been concluded and every auction has different characteristics, different supply/ demand of spectrum put to auction etc which was instrumental in making that auction successful or failure. For instance 2014 and 2015 auction was mainly for expiry licensees with business continuity risk, they perform were pushed into “must have” situation leading to severe financial burden. There were cases observed in previous auctions due to some of the inherent design / auction rules which had compelled expiry licensee to exit the market in view of availability of lower quantum as that spectrum was acquired by existing licensee.
- Spectrum availability and pressure on TSP to acquire spectrum are the two important parameters for any auction from the valuation perspective. This forthcoming auction is for the auction of fresh spectrum in 700, 2100, 2300 and 2500 MHz band. Whereas across 800, 900 and 1800 bands only 68.3 MHz (800-37.5 MHz, 900-9.8 MHz, 1800- 21 MHz) is being proposed to be put for auction is small chunks of expiry and unsold spectrum, which have less value.
- We understand that substantial quantum of spectrum in 1800 MHz band is being made available post completion of harmonisation and is likely to be put for auction. This aspect needs to be considered by TRAI while doing spectrum valuation and fixing the reserve price.

- Auction prices in India are very high. Using the Discovered Auction Price would most likely lead to unsold spectrum with a corresponding reduction in service quality. Thus Government should fix the price of the spectrum at reasonable levels and also consider the expenses incurred by TSPs in meeting the rollout obligation with the liberalised spectrum for the purpose of spectrum valuation.
- As an illustration, spectrum proposed in this paper if being offered for sale by the Government basis auction determined prices of recent auctions, it will bring the revenue of **INR ~5.0 trillion for exchequer, or about three times reported total revenues in the industry of last four quarter which was INR ~5.6 trillion**. A copy of the calculation can be provided on request. This does not include spectrum that will become available over time in India. **Since 2010 the industry has paid aggregate INR 2.6 trillion for spectrum**. The current spectrum price level is therefore a significant burden to the industry and it will be very difficult for TSPs to acquire spectrum on such a high price.
- In view of above, fresh valuation needs to be done considering the quantum of spectrum available for auction and the demand & supply status across the LSAs / bands to ensure that fresh spectrum put for auction will not remain unsold.
- However, if the prices revealed in the March 2015 auction for 800/900/1800/2100 MHz spectrum should be taken as reference for valuation of spectrum for forthcoming auction as a benchmark only in the cases where all spectrum was sold in a LSA/band. The reserve price at discounted rate should be fixed for those LSAs/ bands (especially in 900 & 2100 band) wherein demand was not equal to supply and / or high auctioned determined prices were due to expiry licensees.

**Q21. Should the value of 700 MHz spectrum be derived on the basis of the value of 1800 MHz spectrum using technical efficiency factor? If yes, what rate of efficiency factor should be used? Please support your views along with supporting documents/literature.**

**Q22. Should the valuation of 700 MHz spectrum be derived on the basis of other sub-GHz spectrum bands (i.e. 800 MHz/900 MHz)? If yes, what rate of efficiency factor should be used? Please support your views along with supporting documents/literature.**

#### **Telenor (India) Response:**

- Previous attempts have proven that calculating value holds limited merit. As long as the reserve price is set sufficiently low, competition will lead to the market clearing price (=value). 1800 MHz and 700 MHz are not perfect substitutes in India because the majority of users still use 2G only on 1800 band, and 700 MHz cannot be used for 2G services.

- In Europe discovered prices for 700 MHz and 800 MHz is approximately 2-3 times higher than 1800 MHz on a per MHz basis, but in Europe the 4G penetration is much higher than in India.
- Similarly, in 2014 and 2015 auctions, very high prices observed in 900 MHz band was a function of bidders being in a “must win” situation and is not representative for willingness to pay/value in a new band.
- The Auction Discovered Prices in India are at the moment too high. Linking the value of 700 MHz to 900 and 1800 MHz prices includes the inherent risk of overestimating the value of 700 MHz .

In view of above, it is recommended that while doing valuation of 700 MHz spectrum should not be derived basis 900 and 1800 spectrum.

**Q23. In the absence of financial or non-financial information on 700 MHz, no cost or revenue based valuation approach is possible. Therefore, please suggest any other valuation method/approach to value 700 MHz spectrum band along with detailed methodologies and related assumptions.**

#### **Telenor (India) Response:**

- Previous attempts have proven that calculating value holds limited merit. 700 MHz is an attractive 4G band for any TSP. There is no risk in setting a low reserve price. Competition will, regardless, lead to the market clearing price (=value).

Ofcom in 800MHz, 1800 MHz and 2600 MHz auction held in 2012 had adopted an approach of setting “low but nontrivial” (LBNT) reserve prices, i.e. reserve prices that are being set sufficiently high to deter frivolous participation but without any attempt to approximate the market value of spectrum. LBNT reserve prices are typically suitable in auctions that are expected to be competitive, as they minimise the risk of inefficiently pricing off demand through setting reserve prices too high. This should encourage participation and thus increase the competitiveness of the auction, and is a safe strategy if competition in the auction can be expected to lead to market-clearing prices and find the efficient allocation regardless of the level of reserve prices.

*(Reference: A DotEcon and Aetha Report for Ofcom on Spectrum value of 800 MHz, 1800 MHz and 2.6 GHz, July 2012)*

- The forthcoming auction where substantial quantum of fresh spectrum will be put to auction and there is no pressure on TSPs to acquire spectrum due to expiry licenses, it is recommended that TRAI may consider similar approach as adopted by Ofcom in fixing the reserve price.

**Q24. Should the value of May 2010 auction determined prices be used as one possible valuation for 2300 MHz spectrum in the next round of auction? If yes, then how? And, if not, then why not?**

**Q25. Should the value of the 2300 MHz spectrum be derived on the basis of the value of any other spectrum band using the technical efficiency factor? If yes, please indicate the spectrum band and technical efficiency factor with 2300 MHz spectrum along with supporting documents.**

**Telenor (India) Response:**

The valuation of 2300 MHz band should be done a fresh instead of using 2010 auction discovered prices due to the following reasons:

- Device ecosystem was underdeveloped in 2010 vis-a-vis in 2015: 18 devices were available in compare to 1,021 devices available today in Band 40 of 2300 MHz LTE band. Even the cell range (in Km) and Coverage area (Km<sup>2</sup>) is very poor in 2300 MHz in compare to sub- 1GHz bands. For instance, cell range in dense urban location is 0.70 Km for 700 MHz whereas for 2300 MHz band has 0.30 Km and 0.27 Km for 2500MHz respectively for cell range. Similarly, coverage area is 0.95 KMs in 700 MHz vis-a vis 0.17 and 0.14 in 2300 MHz and 2500 MHz respectively. This data clearly shows that the 2300 spectrum band is inefficient band with poor propagation characteristics.  
(Reference – ZTE White paper, June 2013 available on GSMA website)
- Presently this band is being considered as capacity band and it is likely to be used along with other bands to supplement the capacity requirements in dense urban and urban areas to offset the high deployment cost.
- TSPs acquired spectrum in 2010 auction with expectation to gain by first mover advantage. However, all TSPs are still struggling to launch the services even after five years due to the fact this is enhanced capacity band to be used as supplementary band and is not viable for meeting the coverage requirements. A large TSP who has acquired pan India spectrum in 2300 MHz band way back in May 2010 is yet to launch the services commercially in this band due to poor propagation characteristics of this band and acquired additional spectrum in 1800 band for coverage requirement.
- TSPs who acquired spectrum in 2010 were not realised intensity of challenges which they are facing now in the network rollout. The lack of clarity over future spectrum availability in May 2010 compounded the TSPs' fear that failure to buy spectrum in that auction can prevent them from offering high-speed data services in the foreseeable future.

- TSPs acquired spectrum in 2010 for the launch of 3G and BWA (LTE) services. It took around 3 years for TSPs to develop device ecosystem to launch 3G services and LTE services are yet to see the light of the day. The pace of change of technology advancement is impacting the TSPs and consumers are also unable to reap the 3G benefits due to intense competition. Therefore, TSPs are now forced to rollout 4G networks without the realisation of investment made in May 2010 auction. It is becoming difficult for TSPs to cope-up with such frequent technological changes as they finances are locked in auction EAs.
- If at all, valuation of 2300 spectrum is being done by the Authority basis 2010 auction prices, same should be considered without any indexation due to the above explained reasons.

**Q26. Should the valuation of the 2500 MHz spectrum be equal to the valuation arrived at for the 2300 MHz spectrum? If no, then why not? Please support your comments with supporting documents/ literature.**

**Telenor (India) Response:**

- The proposed two blocks in 8 circles and one block in remaining 14 circles is in Band 41 which has the least number of commercial LTE networks. This band plan follows Option III of the ITU plan which is least popular. This is probably the reason why BSNL/MTNL returned this spectrum. We foresee few takers for the reason above, hence we recommend that the duplex separation should be increased to 120MHz so that it can fall in the Band 7 and then put it to auction.
- In case the Authority decides to go ahead with option III / Band 41 then these blocks should be deeply discounted, with no coverage rollout obligation.
- Presently we do not have a visibility of more than 40MHz in this band, and the remaining 150MHz is occupied by DoS, this should be factored in the valuation of this band.

**Q27. Is there any other method/approach than discussed above that could be used for arriving at the valuation of 700/800/900/1800/2100/2300/2500 MHz spectrum bands or any international auction experience/ approach that could be used for valuation of any of these bands? Please support your suggestions with detailed methodology and related assumptions.**

**Telenor (India) Response:**

- Norwegian regulator uses international benchmarks from previous auctions in comparable spectrum bands (appropriately adjusted for population, ARPU, GDP/capita, licence duration as needed) to assess the market value of the

spectrum. When setting the reserve prices the Norwegian regulator discounts the estimated values considerable to allow for price discovery and to avoid setting the prices so high that spectrum will end up unsold. The reserve prices is not set on a level that should reflect the market value of the spectrum it is rather set on a level that promotes participation in the auction and then competition will lead to the market clearing price (=market value). Although reserve prices should normally not affect final auction prices and outcomes (if not set too high), setting them at a level that is substantially below market value (e.g. close to zero) can produce inefficient outcomes because with starting prices that are that low bidders may have a stronger incentive to behave strategically to prevent prices from increasing. The approach of the Norwegian regulator strikes an appropriate balance between the different concerns.

- Similarly, Ofcom in 800MHz, 1800 MHz and 2600 MHz auction held in 2012 had adopted an approach of setting “low but nontrivial” (LBNT) reserve prices, i.e. reserve prices that are being set sufficiently high to deter frivolous participation but without any attempt to approximate the market value of spectrum. LBNT reserve prices are typically suitable in auctions that are expected to be competitive, as they minimise the risk of inefficiently pricing off demand through setting reserve prices too high. This should encourage participation and thus increase the competitiveness of the auction, and is a safe strategy if competition in the auction can be expected to lead to market-clearing prices and find the efficient allocation regardless of the level of reserve prices.  
(Reference: *A DotEcon and Aetha Report for Ofcom on Spectrum value of 800 MHz, 1800 MHz and 2.6 GHz, July 2012*)

**Q28. As was adopted by the Authority in September 2013 and subsequent Recommendations and adopting the same basic principle of equal-probability of occurrence of each valuation, should the average valuation of the spectrum band be taken as the simple mean of the valuations obtained from the different approaches/methods attempted for that spectrum band? If no, please suggest with justification that which single approach under each spectrum band, should be adopted to value that spectrum band.**

**Telenor (India) Response:**

- The same method should be used for the present valuation of 700 and 2300 and also for future auctions. The valuation of 800/900/1800/2100 has not changed significantly hence the market clearing price with adequate discount should be used.
- The price for 2500 should be set at 50-60% lower than the valuation arrived for 2300.

Please also refer response given in Q27 against this question.

**Q29. What should be the ratio adopted between the reserve price for the auction and the valuation of the spectrum in different spectrum bands and why?**

**Telenor (India) Response:**

- For any successful auction, it is necessary that the spectrum assignments through auction should be that the bidding process leads to:
  - Prices leaving no spectrum unsold (market clearing prices)
  - Allocation of spectrum to bidders with the higher willingness to pay (efficiency).
- Setting reserve prices involves one-sided risk. Too high reserve prices, however, will not trigger a downward pressure on prices, but rather leave spectrum unsold. Therefore the main objective should be to avoid reserve prices that are too high.
- Too high reserve prices will prevent market clearing prices from being discovered, and lead to unsold spectrum. Determination of block sizes and the minimum blocks a bidder must acquire in order to be identified as a winner may lead to inefficient spectrum allocation among bidders, if implemented sub optimally.
- There is little merit in bottom-up valuation as a method of setting appropriate reserve prices for auction, as proven by previous attempts. Government should therefore rather base forward-looking reserve prices on observed market clearing price points from previous auctions where available (**reserve price should be 20-40% below these prices to allow for price discovery**). When such price points are not available, reserve prices should be substantially reduced compared to previous auctions (**40-60% below previous reserve prices**), and could potentially be further guided and “sanity checked” by international benchmarks (appropriately adjusted for population, ARPU, GDP/capita, licence duration as needed).
- 50% discount on the reserve price (RP as fixed for forthcoming auction) where either partial and / or less than 5 MHz (smaller chunks) of fragmented spectrum is available for auction.

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