

Date: 12<sup>th</sup> November 2009

**The Chairman  
Telecom Regulatory Authority of India,  
Mahanagar Door Sanchar Bhawan,  
Jawaharlal Nehru Marg,  
New Delhi- 110001**

**Subject: Response to Consultation Paper on Overall Spectrum Management and review of License Terms and Conditions**

Dear Sir,

We would like to take this opportunity to thank you for coming up with an exhaustive consultation paper on such a sensitive subject like Spectrum encompassing its management, assignment, pricing and trading.

Whilst we are providing our Chapter wise comments we would like to bring to your attention some of the important issues for your consideration.

**1. Forward Path for CDMA Operators:** We would like to bring to your attention that we being a CDMA Service provider are put to a great disadvantage and are unable to see a path forward. Presently CDMA has 20 MHz of spectrum and divided amongst 4 operators. The Government has committed that it will give upto 5 MHz of spectrum to each operator. Further out of this 1.25 MHz in 800 band is being auctioned for providing EVDO services. Unlike GSM operators where they have 25 MHz of spectrum in 900 band and 75 MHz of spectrum in 1800 band, the CDMA operators have nothing beyond 20 MHz of spectrum 800 band of spectrum which is being used by all 4 operators. We strongly urge TRAI to request to the Government to open up other bands like 700 MHz, 450 MHz, 1900 MHz etc urgently for CDMA operators.

**2. Anomaly in allotment of Spectrum between GSM and CDMA Operators** Further GSM operators are given initially 4.4 MHz of spectrum and on one step by meeting certain criteria's they get 6.2 MHz of spectrum. Where as in the case of CDMA operator initially only 2.5 MHz of spectrum is awarded, and they have to go through two steps, to go upto 5 MHz of spectrum, which incidentally is the ceiling as prescribed in the license conditions. This anomaly should be corrected immediately, and CDMA operators should be given 3.75 MHz of spectrum initially itself as being given to GSM operators to maintain level playing field.

**3. Allotment beyond 6.2 MHz of spectrum.** We strongly advocate that spectrum beyond 6.2 MHz in case of GSM and 5 MHz in case of CDMA should not be allocated to any operator, and Government should take away the surplus spectrum that has been allocated beyond 6.2 MHz. Till such time the operators do not surrender, the operators should be charged as per the following retrospectively from the date of allocation.

The Government should charge yearly fees of Rs. 300 Crs/ per MHz of spectrum for Metros and "A" Circles and Rs. 200 Crs / per MHz of spectrum for "B" Circles and Rs. 200 Crs/ per MHz of spectrum for "C" Circles apart from additional usage charge of 3% per MHz/ per year based on AGR, retrospectively from the date of allocation of additional spectrum.

The operators have raked huge profits due to these additional spectrum allocations, and to maintain level playing field these operators should be asked to pay up immediately, and surrender the spectrum as they are enjoying the benefits without paying any additional charges.

**4. Allotment of spectrum for In building.** It is needless to emphasize the need for in building in the Metros and Tope tier cities. Therefore we urge the Regulator to recommend to the Government to allocate One Carrier in CDMA and 3 MHz of spectrum in GSM for in building solutions.

We are enclosing herewith our reply to the question raised in the consultation paper in the annexure.

Thanking you in anticipation.

Yours sincerely,  
For **Sistema Shyam TeleServices Limited**

**T. Narasimhan**  
Dy. Chief Executive Officer.

**Copy to :**

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## Spectrum requirement and availability

**1. Do you agree with the subscriber base projections? If not, please provide the reasons for disagreement and your projection estimates along with their basis?**

Various agencies have estimated Indian market. TRAI's estimation has been the most aggressive estimates. One of the major assumption of TRAI is the past growth. This may not provide for an accurate projection since past growth rates may not continue in the future considering limited scope for penetration in some circles. For instance, penetration growth rates for subscribers in Metros is expected to be lower than growth rates in Category B and C circles where the current penetration level is lower. Our estimation is 700 plus million by 2014. The estimation of the growth of mobile subscribers by different agencies are given below:

**2. Do you agree with the spectrum requirement projected in ¶ 1.7 to ¶1.12? Please give your assessment (service-area wise).**

An estimate of spectrum requirement per operator has been calculated based on a variety of factors, which are interdependent on each other, including the number of base stations installed, the capacity per station and the allocated spectrum.

For computation of the subscribers supported within a particular spectrum of 6.2 MHz, we have analyzed the scenario for a unit sq km. Pl. note the assumptions are being considered for a typical dense urban area

### Key Assumptions

- Allocation of spectrum – 6.2 MHz (32 channels) per operator
- BCCH – 14 Channels , NBCCH – 16 Channels , Microcell – 2 Channels.
- Max Hardware configuration – 4/4/4 for macro sites and 2/0/0 for Microcells.
- AMR penetration in market is > 90%
- > 60% traffic can go on AMR HR maintaining QoS of call.
- SAIC penetration of Mobiles > 40%, improves the spectral efficiency.
- mE/sub assumed to be 35 mE as per industry average.
- Max of 17 macro sites can achieved per Sq Km., with an intersite distance of approx 200 meters

Based on these assumptions, capacity for a site has been calculated as below:-

### Capacity – Macro Site 4/4/4

### Micro Site 2/0/0

Erlang Calculation	Sector 1	Sector 2	Sector 3	Sector 1
Number of TRX	4	4	4	2
Number of SDCCH timeslots	3	3	3	1
Number of GPRS timeslots	2	2	2	1
Available Traffic T&FR	38	28	26	13
Percentage of AMR	0.5	0.5	0.5	0.5
Number of HR timeslots	13	13	13	6
Total Traffic Timeslots Available	39	39	39	10
Maximum Erlang Per sector	30.08	30.08	30.08	12.33
Unevenness Percentage	0.1	0.1	0.1	0.1
Number of Timeslots available after unevenness	35	35	35	17
Erlangs Available - after unevenness	26.43	26.43	26.43	10.66
Maximum Erlang Per site	90.24			12.33
Design Erlang Per site	79.30			10.66

**Erlang per Site – 79.30 Erlangs (Macro site)  
10.66 Erlangs ( Micro site)**

### Macro Level Planning

- The area considered i.e. 1 sq km, can cover 17 Macro sites and 5 Micro cells in a typical dense urban area to high dense urban area
- Erlangs that can be carried in the unit 1 sq. km area =  $17 * 79.03 + 5 * 10.66 = 1396$  Erlangs
- **Maximum subscribers that can be supported on 6.2 MHz per operator =  $1396 / 35$  mE ~ 40,000 subscribers**
- **Maximum subscribers to be support on 6.2 MHz for 10 operators = 4 Lac subscribers**
- Comparing the subscribers supported to the population per sq. km w.r.t. a Circle like Delhi
- Delhi circle Area = 1484 sq km; population ~ 25 million; Dense Area : Average Area Population ratio – 10:1
- Average Population density –  $25 \text{ mn} / 1484 = 17,073$  per sq. km
- **Dense area Population density –  $17,073 * 10 = 1.7$  Lacs people**

Accordingly, it can be concluded that 6.2 MHz spectrum should be sufficient to provide much more than 200% population coverage in dense urban areas and high dense urban areas

Certain considerations that can further supplement the above calculated capacity are:

- IBS can be deployed aggressively in this area – there is no limit to deployment of the same as there are separate frequencies reserved for IBS

- Erlang capacity of the site calculated is base number. The same can be further enhanced using several spectral efficiency features such as SAIC, Progressive Power control, Antenna Hopping, ICC/ STIRC, Synchronization, DFCA/ IBCA, AMR packing unpacking, Robust AMR signaling. All these features result in decreasing the interference and increasing the soft capacity i.e. Half Rate penetration (Refer Appendix A-3 for details)
- Intelligent algorithms like DFCA are available which can increase the hardware
- Configuration of the site e.g. 4/4/4/ to higher configuration e.g. 6/6/6/
- With 6.2 MHz, one can get good trunking efficiency gain than 4.4 MHz
- Frequency reservation on IBS is possible with 6.2 MHz
- Pole / Micro/ Pole cells are available that can be deployed for hotspots coverage

**Therefore, it is recommended that the spectrum projections should be done basis 2 X 6.2 MHz for GSM and 2 X 5 MHz for CDMA which is adequate to support the subscriber growth in all places including dense urban / high dense urban areas**

This translates into an average spectrum requirement of 62 X 62 MHz for GSM (with 10 operators) and 15 X 15 MHz for CDMA (with 3 operators). Considering an example for Delhi, the above calculation provides the total spectrum requirement for 77 MHz against the available spectrum of 68.6 MHz

**Thus, there is a requirement for additional spectrum to be allocated to operators within the limits as defined in the UAS license agreement i.e. 2 X 6.2 MHz for GSM and 2 X 5 MHz for CDMA.**

**A separate band should be allocated in Metro and top 100 towns for in building coverage.**

### **3. How can the spectrum required for Telecommunication purposes and currently available with the Government agencies be re-farmed?**

**There is an accelerated need for spectrum refarming in India as the present capacities available with the operators are insufficient to efficiently service the demands of the rapidly expanding subscriber base.**

**Proposed mechanism for refarming in India:**

- *Refarming from government agencies:* Spectrum should be refarmed from Government agencies in a timely manner and they may be compensated through a mix of budgetary allocations and proceeds from spectrum auctions. The following steps may be undertaken:
  - An independent committee to be established to identify the agencies holding the required spectrum and take decision for its refarming
  - The committee should also identify additional opportunities for realization of digital dividend by promoting migration to digital broadcasting within the analogue broadcasting Government agencies
  - Negotiation and agreement with agency on costs and timelines to be incurred

- Compensation to agency from license fees, spectrum charges and budgetary allocation
- Allocation of spectrum with priority to operators yet to receive minimum contractual spectrum
- Surplus spectrum post meeting the UAS license commitments to be auctioned
- *Refarming from private operators:* Since refarming from Government agencies is expected to be a long process, and unable to meet the current demands of the industry, it is imperative that as an interim solution, excess spectrum be refarmed from incumbent private operators. Currently, select operators have been assigned spectrum beyond the contracted amount specified in the license, and without payment of any market linked fee. This is against the principle of level playing field and undermines efficient utilization of spectrum. It is recommended that such excess spectrum be refarmed by adopting the following process
  - Spectrum granted without payment of upfront market based fee may be taken back from operators
  - As the 900 MHz band is more efficient than the 1800 MHz band, the re-farming efforts should be undertaken band-wise, with a spectrum cap defined on the 900 MHz band. This cap should ideally be distinguished by LSA. For example, for Metro LSAs, the operators could be allotted a maximum of 4.4 MHz in the 900 band for GSM, whereas for non-Metro LSAs the limit could be specified at 2.2 MHz for the 900 band for GSM operators.
  - Such refarmed spectrum may be reallocated on a priority basis to operators yet to receive minimum contractual spectrum based on FCFS basis
  - Surplus spectrum (after fulfillment of licensed spectrum allocations) may be auctioned where all operators can participate, subject to spectrum caps

To reiterate, spectrum cap of **2 X 6.2 MHz for GSM and 2 X 5 for CDMA is adequate to support the entire subscriber base**. However, Refarming of spectrum from incumbent operators who have a large subscriber base may adversely impact the quality of service in the short term. To minimize this impact it is recommended that adequate time be provided to the incumbent operator, to arrange for the necessary spectrum through mechanisms like sharing/ trading or through implementation of spectrum efficient technologies. During this interim period, a higher spectrum usage charge, with steep escalation clauses, should be levied on the incumbent operator.

#### **Key conclusions:**

- Government spectrum re-farming would be a time consuming process. As an immediate priority, re-farming from private Telecom operators should be initiated
- Additional spectrum with operators, beyond committed as per the UAS license, should be taken back and reallocated to operators yet to received spectrum
- Private operators re-farming should be considered band-wise with freeing of spectrum in both 900 and 1800 MHz band; Spectrum limits can be defined for different bands (900 / 1800) depending on the LSA
- Independent committee to be established to assess spectrum re-farming potential from government agencies

- Government agencies to be compensated for re-farming from license fees, spectrum re-farming fund, spectrum usage charges and budgetary allocations

**4. In view of the policy of technology and service neutrality licenses, should any restriction be placed on these bands (800, 900 and 1800 MHz) for providing a specific service and secondly, after the expiry of present licenses, how will the spectrum in the 800/ 900 MHz band be assigned to the operators?**

Technology and Service neutrality is imperative to ensure level playing field for all operators and as such it is welcomed in India, in line with the international trend. However, before adoption of a policy of technology and service neutral license regime, it is critical that a robust regulatory framework for the same be designed, with the following objectives

- Provision of equal opportunity to all operators by ensuring level playing field across different technologies used and services offered
- Ensuring conducive competitive atmosphere by fair allocation of scarce resources that are available across the technological platform

**In order to ensure technology neutrality**, it should be noted that 800 and 900 MHz bands are considered to have better propagation capabilities. Accordingly, care should be taken that no operator(s) dominate all spectrum in these bands. In the Indian context this could necessitate re-farming of spectrum from incumbent operators through techniques as suggested earlier, including:

- Cap on spectrum holding across different bands based on LSAs. For example, 4.4 MHz of spectrum in the 900 MHz band could be the maximum cap for any GSM operator in a Metro
- Increase of annual spectrum usage charges for operators holding more than required spectrum in a particular band or at an overall level
- Minimum allocation of spectrum to all operators in each frequency band

**In order to ensure service neutrality**, it should be noted that in case any specific services are allocated to a specific band, the interests of the operators offering those services should be safeguarded by offering a level playing field. For example, if 3G service is being offered in 2.1 GHz band, the same should not be allowed to be offered by an operator in 900 MHz band, due to the inherent advantages of the latter in terms of propagation characteristics and lower capital costs involved. In the instance of permitting services like 3G on lower bands, there should be a provision for auctioning part of these bands to new players as well.

This is in line with global policy. For example, the EU had issued a directive on GSM allowing 900 MHz band to be used for offering 3G services, while ensuring that all the Operators had spectrum allocated within 900 MHz band. Consequent to this, many European countries are allowing mobile operators to allow 3G services on their existing frequency band in effect removing technology and service restrictions on spectrum licenses

#### **License expiry**

It is recommended that licenses should be made perpetual. Detailed commentary, including the recommendations and their underlying justifications has been captured in the subsequent section of Perpetuity of Licenses.

**At the time of spectrum renewal, following steps can be considered for efficient spectrum assignment**

- Band-wise spectrum requirement to be assessed per operator, based on band wise spectrum cap to ensure technology neutrality
- Allocation of band-wise spectrum to be done for all operators based on the contractual terms
- The operator(s) holding the spectrum earlier should be provided the First Right of Refusal
- Surplus spectrum to be auctioned

**5. How and when should spectrum in 700 MHz band be allocated between competitive services?**

In India, spectrum in 700 MHz band is currently not available for commercial use, and should be refarmed for allocation to the Telecom sector immediately. This is the most efficient band and would improve capital expenditure positions of telecom operators, which could then be passed on as subscriber benefits. The same can also be used to offer next Generation service including 3G and 4G, as has been successfully done in USA

**Proposal for usage of 700 MHz band (698 - 806 MHz)**

Spectrum from existing operators utilizing this band for analogous transmission currently could be made available by virtue of conversion to digital broadcasting. This digital dividend would be of immense benefit to the Telecom industry as well as to the economy.

It is proposed that the 700 MHz band be used for IMT services. This band for IMT should be utilized for only one type of duplex arrangement i.e. FDD to make most efficient use of spectrum and provided higher Quality of service.

Mixing of FDD and TDD in the band would lead to inefficient use of spectrum as large amount of spectrum will get wasted in providing guard bands. In Region-1, CEPT has already discussed various band plans and concluded that no mixed FDD/ TDD band plan will be developed at a European level, and that mixing of FDD and TDD should be avoided on national level as well. Considering the discussions and decisions already taken place in other Regions, a FDD band plan would be the more favored solution for industry than a plan that mixes FDD and TDD

Following band structure of 698-806 MHz band is recommended to the defined for India:



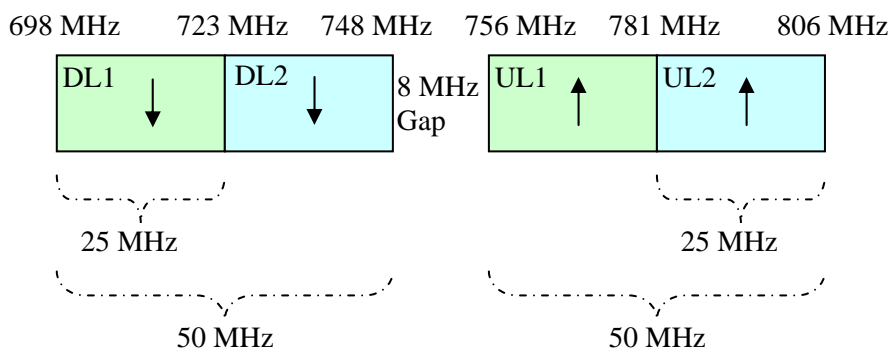


Figure: The band structure with dual duplexers having the same duplex distance which could be of same or different sizes

### Advantages

- Utilizes the largest amount of the available 108 MHz in the 698-806 MHz band
- 2X50 MHz arrangement will minimize the risk of unfavorable fragmentation of this band for mobile broadband usages
- Due to the two adjacent duplex arrangements, the gap between DL (Downlink) and UL (Uplink) blocks can be made smaller than the duplex gaps in other FDD arrangements
- This reversed FDD duplex arrangement, interoperability issues for better co-existence with adjacent radio communication services are also addressed
- Reduces cost and complexity of handsets/ terminals

**Global example:** USA has been the pioneer in releasing 700 MHz, by requiring UHF broadcasters to vacate the spectrum by 2009. Key winners: Verizon – C Block licenses and AT&T - B Block licenses; incumbent operators.

Operators are planning to use their new spectrum to deliver mobile broadband services that could support high-speed data and VOIP. The new services also usher in non-user paid revenues from streams like advertising, wholesale capacity sales and open-access devices and applications. This helps compensate impact of decline in ARPUs which is of particular concern in the Indian context.

At least three different 4G wireless technologies have been proposed for mobile broadband use at 700 MHz. These include WiMAX; long-term evolution (LTE), and ultra mobile broadband (UMB). It is estimated that about 25,000 cell sites would be needed to cover 75% of USA at 700 MHz and to cover the same area on a 2.5 GHz WiMAX network, 65,000 cell sites would be required. However, as traffic builds up additional sites would be required to handle levels equal to 2.5 GHz levels which will erode the advantage for 700 MHz in urban/ populous areas in the long term.

**Since the spectrum in 700 MHz band would be re-farmed, the allocation should be considered on the same lines as allocation for spectrum in other bands i.e. ensuring all operators get the minimum allocated spectrum as per the UAS license. Any surplus spectrum can be auction**

*\* It needs to be noted that the tentative availability of 700 MHz band should be communicated at the earliest. This would facilitate the operators in finalizing their business plans and participation for 3G auction, since it shall provide them a better view on their investment requirements.*

## **6. What is the impact of digital dividend on 3G and BWA?**

The impact of digital dividend, i.e. switching to digital transmission by the current analog broadcasters is expected to yield significant benefits to the economy as a whole, and specifically for provision of 3G and BWA services. Analog broadcasting is primarily transmitted in the 700 and 800 MHz bands currently. These bands have ideal propagation properties as the waves can travel longer distance and penetrate buildings better than the over 1 GHz bands, on which many international 3G and BWA services are based. Consequently, capital investment required will be less than at other bands resulting in lower prices for end users, and faster expansion of services across a much larger area. This also compares favorably vis-à-vis the existing system of providing broadband to rural areas – through landlines and fibre optic networks – as the existing systems are capital intensive and require longer roll out timelines. **Hence, digital dividend is expected to significantly help bridge the digital divide between customer segments.**

According to a study<sup>1</sup>, allocating a proportion of the released spectrum for mobile broadband services adds greater value to the economy than if this band were allocated exclusively to digital TV services. In fact, the economic and social value to the entire EU is estimated to be in the range of EUR 150 – 700 billion over 15 years depending on the growth in demand for Digital Terrestrial TV (DTT) and wireless broadband.

## Licensing Issues

**7. Should the spectrum be delinked from the UAS License? Please provide the reasons for your response.**

Global trend is to delink spectrum from UAS license and the same should be adopted in India going forward. One reason for retaining two separate licenses is administrative convenience in management of the spectrum. In most countries spectrum management is delegated to a different administrative group from the group that regulates other aspects of telecommunications operations, such as price regulation or anti-competitive conduct. By having a separate spectrum license, technical, reporting and compliance requirements can be standardized across all users of the radio spectrum.<sup>2</sup> Also, given that additional spectrum is not easily available and the current amount of spectrum till date is insufficient to meet the contractual requirements of existing players, it would be tougher to link spectrum to further license allocations, if any

However, in India a base minimum spectrum has already been contracted to all UAS licensees, which is subject to roll-out obligations. Delinking of spectrum from existing licensees should not be favored due to the following reasons:

- Certain new operators have mentioned that their break-even period has become as high as 25 years in light of the recent significant cut on tariffs to make service more affordable to the common man. Hence, their current spectrum commitment of 20 years needs to be expanded to ensure that these operators remain in business
- Existing players as well as the recent entrants have entered the industry based on a certain business plan that is based on the awarding of spectrum along with the License. Any modification of the same, within the 20 year period, would alter their business plan
- De-linking of the entire spectrum from all the operators and thereby a subsequent re-allotment based on market based mechanism may lead to increase in tariffs and service un-affordability to the consumer, as the operator's may have to pay high prices for obtaining even the basic minimum spectrum required

**Hence, it is suggested that that all future licenses to the telecom sector should be delinked from UAS licenses, especially given the fact that due to spectrum shortage several existing players have also not yet received their committed spectrum**

**8. In case it is decided not to delink spectrum from UAS license, then should there be a limit on minimum and maximum number of access service providers in a service area? If yes, what should be the number of operators?**

The maximum number of operators will depend on the available spectrum subject to each operator having the option of acquiring minimum between 2 X 6.2 MHz for GSM and 2 X 5 MHz for CDMA. As highlighted in section 2.2 (response to Q. 2), this much spectrum is required and is sufficient to support entire subscriber base even going forward. The minimum operators in an area should be four to five in line with TRAI's suggestion.

**Cap on number of access service providers in a service area:**

In any sector, the objective of capping the maximum number of operators is indirectly linked to assuring the market participants of a minimum return on investment. This is generally required in the following situations:

- When a new market is opened up for private sector
- When there are exit barriers in a market making it difficult for loss making entities to discontinue services which may set off a sustained price war making the whole industry unprofitable
- When the sector dynamics per se are not economical and there is a substantial need for investments by private sector.
- When provision of services is a clear greater priority than cost of service provision
- When investment in the sector entails long gestation period with uncertainty on returns

From the context of the Indian telecom market, none of the above situations are directly applicable. Shortage of spectrum cannot be used as an argument for limiting number of players since players should be allowed to share spectrum. Hence, there does not seem to be a case for capping the number of operators.

#### **Minimum number of access service providers in a service area:**

Objective of setting any minimum limit on number of operators is to ensure competitiveness of the market. As has been suggested earlier by TRAI<sup>3</sup> minimum number of operators in a circle should be four to five. **This level is considered adequate to prevent any cartel/ abuse of market share.** The number is also in conformity with suggestions based on HHI evaluation of other markets. HHI in India ranges from 0.16 to 0.23, excepting J&K which has an HHI of 0.30. As per international trends this level of HHI is achieved when operators **are five or more** according to the table below.

#### **9. What should be the considerations to determine maximum spectrum per entity?**

**The considerations for spectrum should be based on the principles of preventing hoarding of spectrum, making spectrum available to all operators and to facilitate conducive competitive atmosphere by ensuring a technology neutral level playing field**

Spectrum caps must be set under consideration that no operator should retain high spectrum amounts which can place it in a position to abuse market power or gain abnormal benefits. This can harm user interests since increased prices of spectrum may translate to higher tariffs and slower network rollout. Hence, maximum spectrum per entity should be a maximum share of total spectrum available in a circle. However, since the number of operators is much larger and the spectrum is scarce and already in shortage, there is no need to determine maximum spectrum per entity besides in the specific cases of M&A, Sharing of Trading

#### **Considerations:**

Spectrum being a scarce resource is likely to be a target for accumulation, as it could provide significant competitive advantage and supernormal benefits to the holder through reduced capital investment requirements. By spectrum accumulation, overall

price of spectrum rises and other operators are expected to incur additional capex to increase capacity of their network. This will directly lead to higher tariffs for consumers or slower rollout of network and affects the level playing field amongst operators

Firstly, government should consider meeting the contractual commitments to all existing UAS licensees. This could involve re-farming of additional spectrum from certain existing players and re-allocation to others. This shall also help in bridging the issue of level playing field

Any further spectrum allocations, beyond meeting the contractual commitments, should be done based on a market driven approach. It shall ensure that the operator, who has the maximum requirement for additional spectrum and thereby assigns the maximum value to the same, shall obtain it from the market.

**The maximum spectrum per entity should be determined based on the principle of ensuring fair distribution of spectrum amongst all operators as per the contractual obligations, preventing hoarding of additional spectrum, preventing market cartelization/ monopolization and ensuring any additional spectrum allotment based on market based pricing to ensure level playing field**

**10. Is there a need to put a limit on the maximum spectrum one licensee can hold? If yes, then what should be the limit? Should operators having more than the maximum limit, if determined, be assigned any more spectrum?**

Equitable distribution of spectrum is imperative for the Indian industry, at the present time, to promote competitiveness and prevent hoarding with potential for abuse of market power/ deny others use of spectrum. Spectrum hoarding can increase overall price of spectrum thus limiting capital available for new players to provide competitive services and quick rollout. Consequently, the user may have to suffer increased tariffs and slower rollout of services. Hence, there is a need to put a limit on the maximum spectrum one licensee can hold.

However, putting a cap on spectrum (expressed in MHz per licensee) may not remain relevant as over time more amount of spectrum becomes available and market share may keep changing. Also, as the market matures any additional spectrum that is made available can be provided to the operators based on a market driven auction based process. This shall ensure that only the one who values it most shall be able to obtain it. **Therefore, there is no requirement of a maximum spectrum limit per individual entity, unless it leads to market monopolization / cartelization. Such scenario's will get discussed in M&A, Spectrum trading and sharing sections.** Implementing spectrum caps to counter such scenario's is also a globally accepted method as seen in cases highlighted earlier on UK, USA and New Zealand. It can prove effective in countering monopolistic tendencies of incumbents

Hence, our response can be concluded as follows:

- **First priority should be to ensure that all operators received the spectrum as per contractual obligations. This may require spectrum re-farming from operators who are holding more than required spectrum**
- **Cap on Spectrum would be required in case of M&A and trading. However, there need not be a maximum limit in case of direct allocation of spectrum from government, provided it is being given through a market driven process where all operator's have equal right to claim for the additional spectrum**

- For 3G and BWA, since the allocation is in blocks of 5 X 5 MHz, and several circles have only 2 blocks – a single block should be considered as the maximum spectrum per entity, to prevent monopolization of the market

**11. If an existing licensee has more spectrum than the specified limit, then how should this spectrum be treated? Should such spectrum be taken back or should it be subjected to higher charging regime?**

The current limit on the spectrum is 2 X 6.2 MHz and 2 X 5 MHz which is sufficient to support the required subscriber base

**Any additional spectrum available with operators, above the limit should be taken back**

At the same time, the availability of additional spectrum would have provided a competitive edge to the operator as compared to others in terms of capital cost, faster roll-out and capability to offer lower tariff's. Since the additional spectrum was allocated without payment of any market linked fee, **the operator should be charge for the time period for which they have used the additional spectrum.**

In case going forward there is a situation where an operator exceeds the cap set by the authorities, then its treatment will depend on the method in which the excess spectrum was acquired initially. In case it was allocated without payment of upfront fee, then the spectrum may be taken back and allocated to another operator which has not yet received the minimum contracted spectrum of 6.2 MHz. In case all operators have received the minimum contracted spectrum, then the spectrum so taken back from the operator shall be auctioned for the other operators.

Refarming of spectrum from incumbent operators who have a large subscriber base may adversely affect quality of service in the short term. In such cases, before the refarming from incumbent operator is implemented, a sufficient time line should be granted to the operator by when it can either arrange for sharing/ trading of spectrum from other operators, or implement spectrum efficient technologies. During the time period, the spectrum usage charges levied should be increased as the operators' crosses the amount of spectrum held beyond the contractual commitments.

The Government should charge per year fee of Rs. 300 Crs/ per MHz of spectrum and additional usage charge of 2% per MHz/ per year based on AGR.

**12. In the event fresh licenses are to be granted, what should be the Entry fee for the license?**

We recommend that any subsequent license should be de-linked from the spectrum due to 2 key reasons

- There is already shortage of spectrum to meet existing commitment to licensees
- There are large number of operators in any LSA, as compared to any industry benchmark and also as compared to majority of other countries

However, it should be noted that in Telecom sector context there are continuous innovations that keeps leading to innovative business models and new services. Hence, new players should be allowed to enter the market to maintain the competitive

intensity, introduce innovative business models and bring additional offerings to the customers.

To ensure that new operators keep their services affordable and provide coverage to common man, they should be allowed in the market with minimal costs. At the same time, it should be noted that the cost should be sufficient to deter fly-by-night operators from entering the industry.

**13. In case it is decided that the spectrum is to be delinked from the license then what should be the entry fee for such a License and should there be any roll out condition?**

If a license is granted without the spectrum then the entry fee for such a license should be set at a level based on the following principles:

- Recover cost of operations for regulatory functions
- Deter fly-by-night operators from gaining license
- A suitable license fee to be determined by the Regulator keeping in mind, huge amount of money has been paid by the UASL operators.

**14. Is there a need to do spectrum audit? If it is found in the audit that an operator is not using the spectrum efficiently what is the suggested course of action? Can penalties be imposed?**

**There is no perceived need for a spectrum efficiency audit for the operators.** The audit could be required once all the operators are assigned their contractual commitment of spectrum limits. Once the operators fully utilize their spectrum and ask for additional spectrum in order to service more subscriber base, there could be a spectral efficiency assessment that can be requested from the operator or audited

However, given that any additional spectrum is to be made available using the auction process, it implies that only the operator who assigns the maximum value for the additional spectrum and thereby needing it the most, would be able to obtain it. This consequently implies that the operator's would have to be judicious while paying money for additional spectrum since the price is going to be market driven. Hence, it is likely that the operators would explore the measures to improve spectral efficiency in order to minimize their costs burden

Besides, the structuring and implementation of a spectral audit would be a cumbersome process. The key reason being that there are no Global industry standards to define spectral efficiency and it varies on several parameters like type of equipments used, spectral efficiency measures deployed, technology type, nature of coverage offered and so on. Perhaps, this has been the reason why no other country in the world has been able to implement any spectral audit mechanism

**15. Can spectrum be assigned based on metro, urban and rural areas separately? If yes, what issues do you foresee in this method?**

Separate spectrum assignment based on area is a technically feasible alternative. However the design and operational implementation of such a method is very challenging. Some of the key challenges would be:

- How to define a rural, semi-rural, urban customer?
- How to undertake geographic segmentation for rural and urban? How many service areas to be made, esp. given that every service area will have interspersed mix of rural and urban?
- How to administer such large number of services areas that would typically be in the range of 1-2 per district?
- How to ensure no arbitrage possibility in case of applying separate charges in rural areas

Due to the high degree of complexities involved, segregation of spectrum for metro, urban and rural areas will dramatically increase the challenges and administrative overheads. Besides, this will also entail additional investments to make changes in Operator's IT systems and billing processes.

**16. Since the amount of spectrum and the investment required for its utilisation in metro and large cities is higher than in rural areas, can asymmetric pricing of telecom services be a feasible proposition?**

Asymmetric pricing of services is a technically feasible option. However, due to the operational challenges involved, the asymmetric pricing would not be able to serve the objective of provide affordable service to rural consumers. The key reason being that cellular services are inherently mobile in nature and assigning them based on geographic boundary of rural / urban may not be feasible. Asymmetric pricing could potentially result in arbitrage opportunities thereby diluting the objective.

Also, following considerations should be taken into account while assessing the affordability in rural areas:

1. India has the lowest call rates in the entire world and it has further reduced in the recent past to as low as ½ paise per second<sup>4</sup>. While the call charges are the lowest, India is still better in per capita income compared to many other countries. Hence telecom services are affordable to the rural consumers
2. In terms of coverage, earlier operators have already made huge in-roads in rural coverage. With increased competition in urban areas, the focus of operators has moved to rural areas where they can acquire new subscribers with less competition
3. While urban areas have higher investments, they also provide better returns due to the volume of traffic generated and the economies of scale. Similarly, rural areas may required lower investment overall, reduced traffic volumes and subscriber levels result in increasing the capital cost per subscriber. Therefore in term of Capex per sub, there is no significant difference between rural and urban consumers

**Hence, the affordability of service does not seem to be a concern in rural areas. Therefore, asymmetric pricing of telecom services, even if feasible, is not an implementable solution to achieve the objective of enhancing rural penetration.**



## M&A Issues

17. Whether the existing license conditions and guidelines related to M&A restrict consolidation in the telecom sector? If yes, what should be the alternative framework for M&A in the telecom sector?

Each of the key guidelines are summarized below to analyze the restrictiveness of the clause and discussed in detail in the subsequent sections.

Guideline	Restrictive / Not Restrictive	Alternate Framework
Market share (both AGR and subscriber base) not more than 40%	Not Restrictive	Upper limit Should be made 35%
Total number of operators in the respective license area not to go below 4	Not restrictive	Total minimum number of operators must be 5
Within 3 months the merged entity shall meet the condition on the total amount of spectrum allowed for any single operator	Restrictive	Maximum amount of spectrum conditionality must be met but 3 month period is restrictive
Permission for merger accorded only 3 years after the license assignment	Not Restrictive	Continued as it is
Duration of license of the merged entity to be the lower of the two	Not Restrictive	Continued as it is

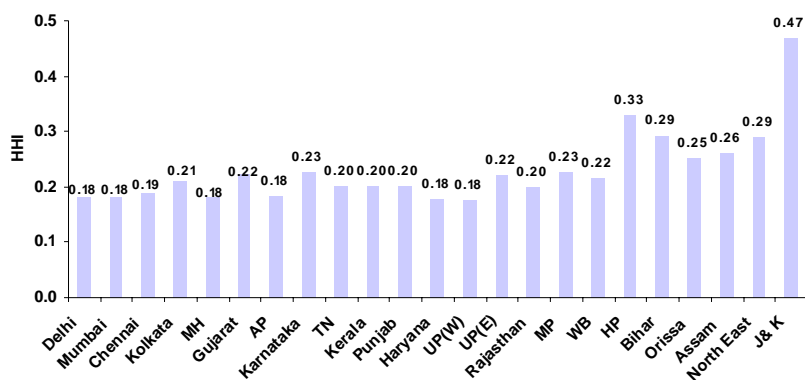
### *Market share (both AGR and subscriber base) not more than 40%*

**This clause could be made a little more stringent and the limit could be nominally brought down to 35%**

The philosophy behind this clause is to prevent monopolistic behavior since an upper limit on Subscriber base and AGR of the merged entity (along with adherence to the Competition Act) would keep monopolistic tendencies in check. However, this guideline was framed when the number of operators in each license area was 5 – 7, which in today's scenario has grown to 12 – 13 operators. To ensure competitiveness in the revised scenario, the combined market share limit could be nominally brought down to 35% to curtail monopolistic activity.

There are over 10 operators in each of the circles today with the biggest operator commanding not more than 25 – 30% of the market share in majority of the license areas. This has resulted in significantly enhanced competition, as is evident from the HHI in each of these LSAs below –

*Figure 1: Extent of Competitiveness (HHI) in each of the license areas in India*



Source: Telecom Regulatory Authority of India Recommendations on Review of license terms and conditions and capping of number of access providers

35% is considered adequate cap for determining monopolization within the industry as the only way such a limit can be breached would be by the merger of the two biggest players in any license area (as shown below) –

The players are arranged in the decreasing order of their subscriber base (Subscriber base of Player 1 > Player 2 > Player 3 > Player 4)

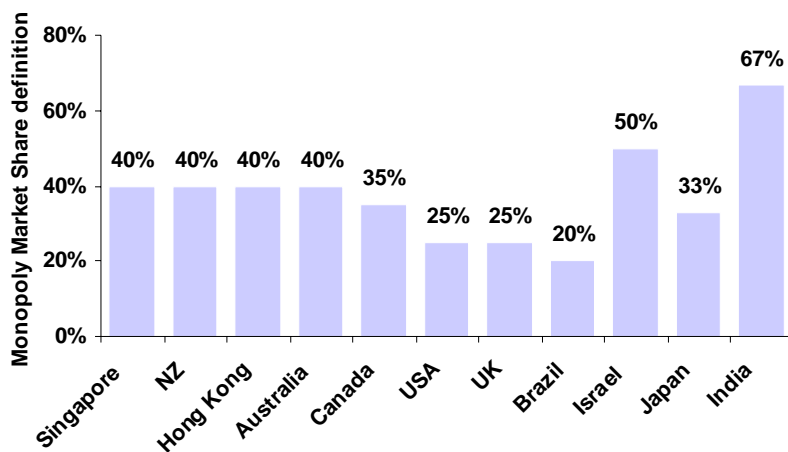
Table 1: Market Share of the biggest 4 operators in the 6 LSA with highest subscriber base

Circle	Player 1	Player 2	Player 3	Player 4	Total Subscriber Base	Market share on merger of Player 1 and 2
Delhi	3.28	2.6	2.36	1.73	12.75	46%
Mumbai	2.67	1.99	1.95	1.49	10.57	44%
Chennai	1.33	1.18	0.82	0.81	5.15	49%
Maharashtra	3.3	2.91	2.33	2.17	14.35	43%
Gujarat	4.66	1.88	1.88	1.72	12.37	53%
AP	4.11	2.78	2.11	1.89	14.52	47%

Source: TRAI Recommendations on Review of license terms and conditions and capping of number of access providers; internal analysis

As all incumbent players who have entered the industry are expected to have a long term view on the industry, and as such may not be the prime candidates for mergers and acquisitions.

Globally, the definition of monopolistic market share differs by country (as depicted in the chart below) and ranges between 20 and 67%. However, India is uniquely positioned and as such there is no direct comparable reference which can be drawn for India as the number of prevailing operators in India is significantly higher as is the underlying subscriber base.



Source: Telecom Regulatory Authority of India Recommendations on Review of license terms and conditions and capping of number of access providers

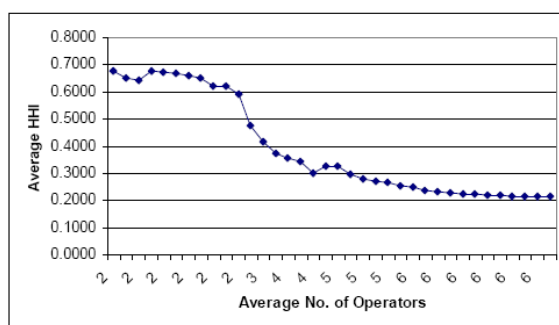
**The total number of operators not to go below 4**

**The minimum of operators can be enhanced from 4 to 5.**

India today has more than ten operational license holders in each circle. While the large number of operators has resulted in competition, the extent of consolidation in the next five years is not expected to be so rampant so as to drive the total number of operators to less than five.

The rate of decrease of HHI (i.e. rate of increase of competitiveness of the market) levels off after four to five operators as indicated in the figure below. This indicates that below 4 or 5 operators the competitive intensity of the market is low and there is presence of dominant players.

Figure 2: Extent of Competitiveness (Average HHI) against the number of Operators



Source: Report of the Committee for "Allocation of Access (GSM/ CDMA) Spectrum and Pricing", May 2009 by Ministry of Communications and IT, Department of Telecom

**Within 3 months the merged entity shall meet the condition on the total amount of spectrum allowed for the merged entity**

**It is recommended that the 3 months clause is restrictive and should be relaxed**

The maximum amount of spectrum allowed to be held by the merged entity should be 12.4 MHz in the case of GSM operators and 10 MHz in the case of CDMA operators. This conditionality must be adhered to by the merged entity after the merger.

The 3 month clause to fulfill this condition is restrictive as 3 months is considered to be insufficient to surrender the spectrum and make alternate arrangements for the spectrum required to sustain the customer service levels.

***Any permission for merger shall be accorded only after completion of 3 years from the effective date of the licences***

Though there is no evidence of such a condition on any M&A transaction in the telecom sector globally. However, a direct comparison with the developed economies with much lower subscriber base and mature telecom industries in these countries may not be appropriate. The three year period prescribed by the authority is considered appropriate to ensure that the new entrants are given enough opportunity to build their subscriber base and strengthen instead of being acquired by incumbents and other dominant operators in any particular license area for access to additional spectrum. This clause supports increase in competition in the telecom industry and is unlikely to restrict consolidation, especially as several players have already completed this 3 year conditionality.

**18. Whether lock-in clause in UASL agreement is a barrier to consolidation in telecom sector? If yes, what modifications may be considered in the clause to facilitate consolidation?**

Lock in period has been introduced to ensure that any player entering the telecom industry does so with a long term perspective and not with an objective of profiteering by making windfall gains and exiting. The period of three years is synonymous with the period given to a new licensee to roll out in a circle.

In the absence of a lock in period clause, players could enter the market with the objective of making supernormal profits through the M&A route, which could result in individual profiteering and drive up overall pricing. Thus, the condition around roll out obligations or three years lock in period clause would ensure any new entrant would have make the requisite capital investment before it is allowed to merge or get acquired by an incumbent or other operator.

**The lock in period is not a barrier to consolidation in the Telecom sector; rather it is imperative for efficient functioning of the industry and to restraint entry of non serious players into the industry.**

**19. Whether market share in terms of subscriber base/ AGR should continue to regulate M&A activity in addition to the restriction on spectrum holding?**

**Restriction of market share (in terms of both subscriber base and AGR) for a merged/ combined entity provides an additional control in the hands of the regulator, to ensure competitiveness in the market besides the regulations of the Competition Commission of India which would address the underlying concerns regarding monopolization and hoarding.**

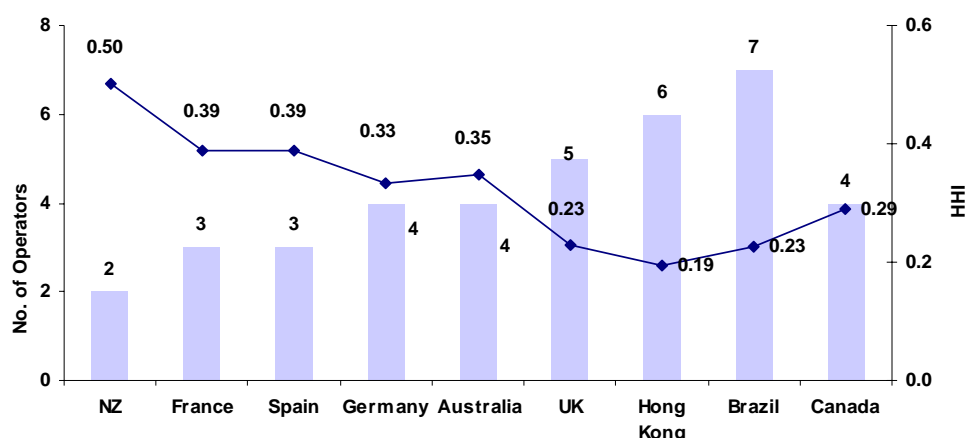
Considering there are already over ten players in each of the license areas, the probability of merging of players to such an extent that the total number goes below the minimum limit and global standard of 4-5 players is envisaged to be minimal. With increasing consolidation and increasing number of new entrants in the industry, the HHI might change to a certain extent.

Globally most of the M&A activities are regulated by the Competition Commission of the respective countries and only have spectrum caps, but don't have a cap on the market share of the merged entity as elucidated below –

Country	Competition Policy
Australia	Spectrum is treated like an asset. The Australian Competition Authority deals with any competition issues regarding the acquisition of spectrum.
New Zealand	General Competition law applies to spectrum trading. The Commerce Act is currently under Amendment
USA	Spectrum caps and competition law, although caps are being phased out.
Canada	Any license transfer may be subject to the Competition Act.
UK	Any license transfer may be subject to the Competition Act.

However, globally, the total number of operators is much less than that in India and the resultant HHI for the industry is significantly different from India, as captured below –

Figure 3: Number of Operators and Competition Intensity globally



Source: Telecom Regulatory Authority of India Recommendations on Review of license terms and conditions and capping of number of access providers

Further, as all these countries have mature telecom sectors, the restrictive policies like spectrum caps etc have been removed over the years, and only the competition act has been continued, with the sole objective of restricting monopolistic possibilities. The Indian Telecom Industry is in a nascent stage of maturity, accordingly, regulatory controls are required to safeguard the interests of the industry participants in addition to curtailing monopolistic practices. These can be relaxed over a period of time as the industry matures and reaches a stable state.

**Hence the market share in terms of Subscriber base/ AGR can be continued to regulate the M&A activity in addition to the restriction on Spectrum Holding but it should be nominally brought down to a level of 35% instead of 40%**

**20. Whether there should be a transfer charge on spectrum upon merger and acquisition? If yes, whether such charges should be same in case of M&A/ transfer/ sharing of spectrum?**

Since the spectrums were issued based on right to use, M & A should be allowed subject to spectrum being optimally utilized. The spectrum so surrendered is to be auctioned.

In the telecom industry, there are 3 key categories of operators whose interests need to be considered, including:

For the incumbent operators, who have already been in the business for a long time, acquisition of other entities or merger would only lead to better spectrum consolidation. Also to keep monopolistic possibilities at bay, there would be restrictions on the combined entity market share (on the basis of subscriber base or AGR) as well as the maximum limit on the spectrum. This transfer charge as a deterrent to spectrum hoarding would not be required.

For the new operators who have been recently allotted licenses and spectrum, the 3 year total coverage roll out obligation and exit restrictions would ensure that they spend the required capital expenditure and thus are unable to make windfall gains by simply hoarding the spectrum and at a later point getting acquired by a larger entity.

The future operators who would have been allotted the spectrum by means of auctions would have anyways paid for their spectrum and license and thus this would ensure that M&A is not exploited as a shorter route to higher gains

M&A would lead to spectrum consolidation and more efficient utilization, which in turn is expected to be beneficial for the end consumers. Also, refarming of the spectrum from the merged entity (if such a situation arises) would be beneficial for the government. Thus absence of transfer charge might not necessarily be a losing proposition for the government either.

Globally, no transfer charges are imposed on the M&A transactions in the telecom industry and there are no separate restrictions for M&A transactions besides the competition commission regulations –

*Table 2: Transfer Charges in the case of M&A transaction*

Country	Transfer Charges
Norway	Norway held a 2.6 GHz spectrum auction in November, 2007. The auction rules included a Band-specific bidding cap of 90 MHz in 2.5-2.69 GHz in any region
Canada	As in the U.S. spectrum caps introduced in the mid-1990s in Canada have been progressively relaxed and then removed.
UK	Competition in the U.K.

- Overall, it is recommended that there be no Transfer charges imposed on M&A, Trading or Sharing of spectrum.

**21. Whether the transfer charges should be one-time only for first such M&A or should they be levied each time an M&A takes place?**

It is recommended that there should be no transfer charges on Spectrum upon merger and acquisition. However, in the eventuality of such a charge coming into force, the same should be a one time charge for the first such transaction instead of being levied each time such a transaction takes place.

**22. Whether transfer charges should be levied on the lesser or higher of the 2G spectrum holdings of the merging entities?**

It is recommended that there should be no transfer charges on Spectrum upon merger and acquisition. However, in the eventuality of such a charge coming into force, it could possibly be levied on the higher of the 2G spectrum holding of the merging entities.

**23. Whether the spectrum held consequent upon M&A be subjected to a maximum limit?**

Spectrum is a scarce and precious national resource and therefore there could be a tendency for hoarding the same by some players (through M&A) resulting in monopolistic market situation, even if there is a minimum number of 4 operators in the market. **Also, for the players who have not got the spectrum through auctions, it could pose as an opportunity to make windfall gains by getting acquired by another entity.** However, Mergers and Acquisition in this sector would also enable spectrum consolidation and thus higher efficiency gains that would be beneficial for all the Industry players. Thus striking a balance is critical to ensure that the maximum limit is not too stringent to deter spectrum consolidation while also ensuring curtailment of monopolistic tendencies.

Globally, the spectrum caps have been applicable in the case of bidding in an auction for a new spectrum band available. The philosophy behind both being the same – to encourage competitiveness in the industry and restrain hoarding of spectrum, some of the International examples could be seen as benchmarks. Since Indian telecom industry is not yet in advanced stages of maturity, the spectrum caps (maximum limit) could be imposed to begin with and later as industry matures should be left up to the market forces.

**Global Examples**

*Table 3: Spectrum Caps*

Country	Spectrum Caps
US	In the 21st century spectrum caps introduced in the mid-1990s have been progressively relaxed and then removed as the sector regulator, the Federal Communications Commission (FCC), has concluded that mobile markets have become effectively and increasingly competitive. The Spectrum caps introduced varied across Mobile Radio Spectrum, cellular spectrum
Norway	Norway held a 2.6GHz spectrum auction in November, 2007. The auction rules included a Band-specific bidding cap of 90 MHz in 2.5-2.69 GHz in any region
Canada	As in the U.S. spectrum caps introduced in the mid-1990s in Canada have been progressively relaxed and then removed.
UK	Competition in the U.K. mobile market has been enabled by the issuance of separate licenses rather than by the imposition of spectrum caps. The auction in 2009 of 2.6GHz band had a "loose" or "safeguard" band-specific spectrum cap of 80 MHz, that relates only to the 2.6 GHz band and does not include spectrum held in other bands, which currently averages in excess of 80 MHz. Ofcom also envisages an auction of "digital dividend" spectrum (550-630 and 790-854 MHz) with similar conditions, and a band-specific 50 MHz cap (out of 128 MHz).

Country	Spectrum Caps
Rest of Western Europe	In contrast to North America, Europe did not introduce spectrum caps but relied on conditions of mobile licensing, for example the number of licenses that were issued, to ensure competitiveness in the mobile market. More recently the trend in Europe has been to rely on measures such as permitting spectrum trading and relying on 'loose' and generous spectrum caps in the new bands being auctioned for broadband services to achieve a reasonable balance between maintaining competition in the mobile market while enabling operators to acquire enough bandwidth to offer broadband services efficiently and economically.

*Source: Mobile Broadband, Competition and Spectrum Caps, An independent paper prepared for the GSM Association, USA, January 2009.*

*It is needless to mention that operators have paid huge sum to obtain spectrum.*

**Though globally, only the national competition policy acts as a watchdog on monopolistic behavior in the case of maximum limit on spectrum on mergers and acquisitions due to the low number of operators the market situation in India warrants a spectrum cap on the merged entity**

*Estimation of Maximum Spectrum Limit should ideally be undertaken as follows*

To estimate the maximum spectrum to be held by any entity we determine the total traffic that is expected to be handled per BTS for a densely populated city in India with a high subscriber base

Subscriber base of the biggest operator in the city = 2.67 Million (25% market share)

Area of the city (in sq km) = 603 sq km

Assuming equal distribution of subscribers, the density = 7348 subscribers per sq km

Traffic per subscriber per BTS per sq km = 0.15 E (assuming both voice and data traffic)

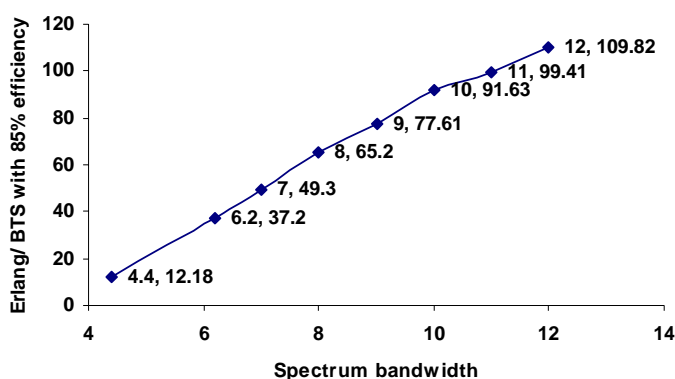
Number of BTS per sq km = 8

Total Traffic per operator per BTS = 83.4 E

**To handle this much of traffic a BTS must have spectrum bandwidth of 10MHz (As per graph below)**

*Figure 4: Efficient traffic handled per BTS against the Spectrum Bandwidth required*





Source: Report of the Committee for "Allocation of Access (GSM/ CDMA) Spectrum and Pricing", May 2009 by Ministry of Communications and IT, Department of Telecom

The increase in cell capacity per additional MHz of spectrum settles to a steady 9 Erlangs / BTS beyond 10+10 MHz. If we assume that hotspots, microcells, etc need a further 2+2 MHz, the saturation point beyond which spectrum efficiency does not improve significantly can be taken to be 12+12 MHz for GSM.

Also, for different levels of traffic per BTS per subscriber and across 3 different Metro cities in India, the required spectrum bandwidth varies as follows –

Table 4: The Spectrum requirement per operator, for varying traffic levels and subscriber base

Traffic per BTS per subscriber (E/BTS/subscriber)	Traffic per BTS (E/BTS)			Spectrum Bandwidth (MHz)		
	Metro City 1	Metro City 2	Metro City 3	Metro City 1	Metro City 2	Metro City 3
0.10	27.8	55.6	92.4	6.2	8.0	11.0
0.15	41.7	83.4	138.6	8.0	10.0	12.0
0.20	55.6	111.3	184.8	8.0	12.0	12.0

Source: TRAI Recommendations on Review of license terms and conditions and capping of number of access providers; internal analysis

For triangulation purposes an alternate method can also be considered –

Assuming the merged entity would hold the largest subscriber base, the market share would be in the region of 28% (as shown for the biggest player in each circle in the data below for 6 circles with highest subscriber base)

Table 5: Market share of the biggest operator in the 6 LSAs with highest subscriber base

Circle	Player 1	Player 2	Player 3	Player 4	Total Subscriber Base	Market Share
Delhi	3.28	2.6	2.36	1.73	12.75	26%
Mumbai	2.67	1.99	1.95	1.49	10.57	25%
Chennai	1.33	1.18	0.82	0.81	5.15	26%
Maharashtra	3.3	2.91	2.33	2.17	14.35	23%
Gujarat	4.66	1.88	1.88	1.72	12.37	38%
AP	4.11	2.78	2.11	1.89	14.52	28%

*Source: TRAI Recommendations on Review of license terms and conditions and capping of number of access providers; internal analysis*

Also, taking into consideration that a minimum of 4 operators need to be present in a circle, an average of 25% of the spectrum could be held by all.

Combining both these, 25% of the total spectrum could be assumed as the upper limit of the spectrum that can be held by the merged entity or the highest held by any operator in the circle.

This figure translates to a maximum of 12 MHz (as shown below)

*Average number of operators per circle = 8*

*Minimum spectrum allocated to each player = 4.4 MHz*

*Maximum spectrum allowed to be held by each player = 6.2 MHz*

*Average Range of the total spectrum for a circle = 35.2 MHz to 49.6 MHz*

*Maximum spectrum allowed for the merged entity thus becomes 25% of the upper limit =*

***0.25 X 49.6 MHz = 12 MHz***

**Considering these approaches, it is recommended that the maximum limit on the spectrum for merged entity for GSM to be 12.4 MHz and for CDMA to be 10 MHz**

## Spectrum Trading

### **24. Is spectrum trading required to encourage spectrum consolidation and improve spectrum utilization efficiency?**

Two alternative approaches to spectrum management are being considered.

- The spectrum which has allocated for right to use
- Spectrum, which has been bought in auction.

In principle spectrum trading is to be allowed only for the spectrum which has been bought in the auction.

Spectrum is a limited national resource and therefore it is imperative to ensure its optimal utilization. Spectrum Trading essentially involves the transfer of rights and associated obligations for the usage of spectrum to those who can generate the greatest value with that spectrum; and therefore, ensures optimal utilization. Spectrum Trading provides a decentralized market mechanism to revise and update initial spectrum allocations. This mechanism can be more effective than refarming, re-auctioning, M&As etc, as it market driven and accordingly, more responsive to changes in technology and demand. Allowing Spectrum trading provides the licensees an option to align the spectrum holdings with it's the spectrum requirements. For example, a licensee could sell or lease a sub-block of spectrum or its use in a particular geographical area, where the same is not being efficiently used for its internal consumption purposes.

Spectrum trading can be an effective mechanism for optimal allocation and utilization of scarce spectrum amongst market participants. Globally also, Spectrum trading has been allowed in all the mature economies and has supported spectrum consolidation.

### **25. Who all should be permitted to trade the spectrum?**

**Only UASL license operators who have been allocated some spectrum should be allowed to trade but no SPVs should be allowed to trade**

This should be done to ensure that all the players participating in spectrum trading are doing so with an objective of spectrum consolidation and not as alternative route for the entry for new operators into the market. This restriction would ensure that spectrum trading is being undertaken with the underlying intent of enhancing efficiency and ensuring optimal utilization and does not result in enhancing competition and furthering the fragmentation of the industry.

Maximum spectrum cap needs to be adhered to in all the cases. Thus if an operator intends to trade in spectrum beyond the maximum spectrum cap, it would need to surrender some spectrum to be able to adhere to the spectrum cap. In terms of a roll out obligation, the operators don't have to fulfill the roll out obligations as a precondition to spectrum trading, though all the regulations applicable in general circumstances remain applicable for these operators too.

Globally there are no restrictions on the players who can enter into spectrum trading.

**All the guidelines around M&A in spectrum must also be applicable to the spectrum trading by operators**

**26. Should the original allottee who has failed to fulfill "Roll out obligations" be allowed to do spectrum trading?**

**An allottee who has failed to fulfill "Roll out obligations" must not be allowed to do spectrum trading.** However, in the instance where no spectrum has been allotted to the operator yet, the roll out obligations would not hold and in such a scenario they must be allowed to trade only after completion of an initial lock in period of 3 years.

Trading out would provide such original allottees that have been unable to fulfill roll out obligations on genuine grounds of insufficient funding or business issues an exit route, while also ensuring optimal utilization of the scarce spectrum resource and therefore would be beneficial for the industry as a whole. Simultaneously, the restrictive clauses (of higher transfer charges and minimum lock-in period) will provide an entry barrier/deterrent for allottees proposing to enter the industry with sole purpose of making windfall gains.

**Roll out obligations would ensure efficient spectrum utilization by helping spectrum consolidation, while preventing profiteering by the allottee and also not adversely impact the earnings of the government.**

**27. Should transfer charges be levied in case of spectrum trading?**

**In the case of spectrum trading, no spectrum transfer charge should be levied since already there are myriad charged which are levied on the operator including spectrum usage charge, upfront license fee and taxes among others.**

A scarce and valuable resource, spectrum is owned by the government and only leased to the operator for a specific duration. Any operator trading it to another operator need not pay to the government since the operator who is buying the spectrum would still be paying a spectrum usage charge to the government, thus its not a question of change in ownership from government to the operator.

Globally most mature markets, with developed secondary trading markets do not levy a specific transfer charge for spectrum.

**In line with the policies globally, there should be no transfer charge levy**

**28. What should be the parameters and methodology to determine first time spectrum transfer charges payable to Government for trading of the spectrum? How should these charges be determined year after year?**

**There should be no transfer charge payable to the government on trading of the spectrum**

**29. Should capping be limited to 2G spectrum only or consider other bands of spectrum also? Give your suggestions with justification.**

It is suggested that Spectrum capping be not limited to the 2G category. It should encompass all other bands as well and separate caps should be defined at a band-wise level. This should be primarily done with the objectives of ensuring efficient utilization and competitiveness across bands.

In several countries the regulators have been imposing high level band-specific caps (40% - 70%+) of the new spectrum on offer. In the U.S. and Europe, relaxations of restrictions on spectrum use, such as greater technology- and service-neutrality in

licensing and permitted spectrum trading, are increasingly being implemented or evaluated as valuable remedies for dealing with competition problems, in coordination with the application of general principles of Competition Law. While in India, these have not yet come in place, the competition can be ensured by means of other ways like band specific Spectrum Caps

Although globally, countries have moved towards technology neutrality and in the process removed spectrum caps, the spectrum caps that existed intermediately were not aggregated across different bands.

Accordingly, it is recommended that in India also the spectrum caps should be implemented band-wise and should not be limited to 2G. Each frequency band must have individual cap and spectrum caps must not be viewed by aggregating spectrum across bands. Since spectrum is a scarce resource and valuable across different bands of frequency, the caps on 2G along with other bands would ensure competitiveness in the Indian telecom industry.

**It is also recommended that the spectrum cap be reviewed after 3 years for all the categories.**

**30. Should size of minimum tradable block of spectrum be defined or left to the market forces?**

It is suggested that the minimum tradable block of spectrum must be kept at 1 + 1MHz of frequency band for GSM and 1.25 + 1.25 MHz band for CDMA since it provides for efficient utilization and has been established that technically it is enough to support a substantial number of additional subscribers.

**31. Should the cost of spectrum trading be more than the spectrum assignment cost?**

**It is suggested that the cost of spectrum trading could be higher than the Spectrum Assignment Cost based on the following analysis –**

Lower spectrum trading cost would encourage spectrum consolidation by players trading the spectrum rather than always applying for fresh blocks of spectrum, thus helping consolidation grow without the intense competition for allocation of new spectrum. Also, spectrum is like land in more ways than one. While the acquisition cost of the land is akin to the one time payout for spectrum while buying and recurring annual charges would be similar to annual usage fee for the spectrum. In a similar vein, the market value of spectrum, just like land, is expected to be higher than the regulated value taking into consideration various characteristics that the market may place premium on. For instance, there are significant efficiency benefits of contiguity. Facilitating contiguous spectrum potentially provides significant technological efficiencies, such as trunked systems.

In a way higher charges might also go against the spirit of allowing the players to trade the spectrum, since Spectrum Trading is supposed to aid in allowing the spectrum to be transferred through the market mechanism to those that can generate the greatest value with that spectrum and so helps secure optimal use of the limited and valuable spectrum resource. Trading (if allowed) would further the objectives of spectrum consolidation and better spectral efficiency. Higher cost of trading (than the spectrum assignment cost) would also discourage the original allottees of the spectrum from selling their spectrum or sub blocks of spectrum to those who can generate highest

value which in turn would lead to an artificial scarcity of an already scarce and valuable resource. But this would depend more on the maturity of the market and number of players in the market.

**The 3G Auction reserve price could be used as the Spectrum Assignment cost on a normative basis. Also, considering the 900 MHz frequency band is more valuable than the higher frequency bands like 1800 MHz and others, the benchmark spectrum assignment cost for comparison must be substantially higher than that for the higher frequency bands**

## Spectrum Sharing

### 32. Should Spectrum sharing be allowed? If yes, what should be the regulatory framework for allowing spectrum sharing among the service providers?

Spectrum sharing enables operators to lease their surplus/ unused spectrum to other operators on commercial terms, which consequently results in more efficient allocation and optimal utilization of the spectrum, which is already a scarce resource . It also allows the operators to share each other's spectrum in a mutually beneficial manner in order to improve the overall trunking efficiency.

The primary reasons for allowing sharing of spectrum include:

- Better utilization of the excess spectrum available with incumbent operators having a low subscriber base; New operators who are in the process of rolling out their networks and can share any excess spectrum available with existing operators
- From the Regulators' point of view, a scarce resource like spectrum is being used more efficiently to service customers better. Also the administrative fee on spectrum sharing adds to a source of regular revenue to the government
- For consumers: Smooth transition for consumers of incumbent operators if and when spectrum refarming is implemented in India. Once spectrum refarming is implemented in India, the incumbent operators would be asked to surrender excess spectrum back to the government. During the transition period, spectrum sharing could be the most efficient short term solution to serve the customers without adversely affecting the services
- For operations: Spectrum pooling by operators would enable reduction of initial investment for roll out of network, in terms of reduced number of Base Trans-receiver Stations (BTS) required

Spectrum sharing would offer an effective alternative market mechanism to spectrum trading, such that the operators with excess spectrum can share the spectrum till such time that they would need the entire spectrum for efficient coverage of their own subscriber base, when it can be taken back by the giver.

The regulatory framework around Spectrum Sharing needs to be developed to address the following aspects:

- Pre conditions for Spectrum Sharing – Roll out obligations,
- Characteristics of the entities who can carry out spectrum sharing – Only operators with existing licenses and associated spectrum should be allowed spectrum sharing.
- Minimum or maximum lot size in which sharing is expected to be done – Minimum band for sharing: There should be no cap on the minimum or maximum band of spectrum that can be shared between operators. It would be done on the basis of mutual consent and market intervention
- The frequency bands in which spectrum sharing would be allowed and the charges and sharing price across each frequency band
- Charges and Fee – Spectrum Sharing Charges (regulated or market determined) and Spectrum Sharing administrative fee, which is payable to the government

- Any limit on the minimum or maximum tenure or renewal period for the shared spectrum
- Other regulatory, anti monopolistic conditions around Spectrum cap restrictions, roll out obligations and market share restrictions.
- Business models allowed for Spectrum Sharing –
  - Spectrum Sharing Model: Spectrum sharing in most simple form can be leasing of the given quantum of spectrum in a geographical area/ LSA for a given period. The quantum of spectrum taken on lease is totally available to other licensee for the period of lease and can be most optimally used for design of the network or to provide better services to its subscribers. The other method is pooling of spectrum resources jointly by the concerned service providers and effectively deploying it to provide better services to customers and economize on number of BTS to roll out the services. In such cases dependency of the operators on each other increases and such spectrum sharing are generally preceded by active infrastructure sharing among them
  - Both leasing and pooling of spectrum must be allowed since in the cases where operators have excess spectrum, it's the model around leasing that would enable higher spectral efficiency while in the cases like business districts of metros, the pooling of spectrum by 2 or more operators should be able to help all the operators in providing quality service to their consumers.
  - Leasing: There is a possibility of making super normal gains in this business model by a new entrant who is hoarding spectrum thus a differential fee payable to government depending on the roll out obligations fulfilled can be enforced.
  - Pooling of Spectrum: The operators pooling in spectrum would be the ones already in need of additional spectrum and have fulfilled their roll out obligations thus would be liable to pay only a nominal fee to the government. Globally, while spectrum trading has been well defined and detailed regulatory framework is prescribed, spectrum sharing is generally treated as part of active infrastructure sharing
- Exit clause

**Overall, all the guidelines applicable on Spectrum M&A and Trading must also be applicable on Spectrum Sharing**

### **33. What should be criteria to permit spectrum sharing?**

**All the key criteria permitting the Spectrum M&A must also hold for Spectrum Sharing –**

- Market share (both AGR and subscriber base) should not be more than 35%
- Total number of operators in the respective license area not to go below 5
- Within 3 months the merged entity shall meet the condition on the total amount of spectrum allowed for any single operator
- Permission for merger accorded only 3 years after the license assignment



- Duration of license of the merged entity to be the lower of the two
- Both the operators undergoing spectrum sharing arrangement must fulfill roll out obligations. In case one of the operators has not yet been assigned the spectrum, then the roll out obligations don't hold true for that operator, but besides such a scenario it needs to be fulfilled.
- Also, the regulator would have the discretion to consider allowing Spectrum M&A, trading or sharing on a case to case basis (Exceptional basis) in case any of the conditions is not being met.

**34. Should spectrum sharing charges be regulated? If yes then what parameters should be considered to derive spectrum sharing charges? Should such charges be prescribed per MHz or for total allocated spectrum to the entity in LSA?**

The spectrum sharing charges should be market driven to ensure that spectrum is put to the most efficient use as determined by the highest bid received for the spectrum sharing fee and no regulatory constraints should be imposed on the sharing of spectrum. This would ensure that the spectrum is being made available to those who can put it to best use.

Globally there are no instances of regulated charges for Spectrum sharing.

**35. Should there be any preconditions that rollout obligation be fulfilled by one or both service provider before allowing the sharing of spectrum?**

Globally no countries have any rollout obligations to be fulfilled as a precondition to sharing of spectrum.

In India, to ensure a level playing field across all the players, fulfillment of rollout obligations for all the entities is suggested. The operators who have not been allocated spectrum would not need to fulfill the rollout obligations but for all the operators who have been allocated the spectrum the roll out obligations would hold.

Also the preconditions as applicable for M&A would hold in the case of Spectrum Sharing also – Spectrum sharing would be allowed only 3 years after the spectrum assignment to an operator.

To ensure that no new entrant is planning to enter only for the high gains by sale or sharing of the spectrum, the roll out obligations are suggested to be mandatory for the all the entities sharing the spectrum.

**36. In case of spectrum sharing, who will have the rollout obligations? Giver or receiver?**

All the entities entering into the Spectrum sharing arrangement need to fulfill the roll out obligation. The period to fulfill the rollout obligations would begin only from the date of allocation of spectrum



## Perpetuity of Licenses

### 37. Should there be a time limit on license or should it be perpetual?

Persuant to migration to Revenue share regime, the life of license has lost meaning, as the license fees has been embeded into the revenue share, and Government is not loosing any revenue. The licenses have been issued at different timing beginning, 1993, 1995, 1998, 2001, 2005, 2009 etc. Dual technology licenses have been issued under the same license and further even 3G licenses are being envisaged under the same license.

Perpetuity of licenses is imperative for efficient functioning of the industry in the future. It is recommended that in the future spectrum be de-linked from the license and a proportionately reduced fee be charged for the license. However, for existing license holders, who have been allocated spectrum, the award of perpetuity should encompass both the license and the assigned spectrum upto 6.2 MHz of spectrum for GSM and 5 MHz for CDMA operators.

Limiting the duration of the license creates significant uncertainty in the operators' business model and inhibits futuristic business planning, especially as the terms of license renewal are not well established. This could result in the operator hesitating in deploying new technologies or undertaking long term capacity enhancement related capital expenditure, as they move closer to license expiry period. This would be detrimental to the interests of the consumers, who may consequently suffer from declining level of services or be forced to move to a new operator.

Accordingly, making the license perpetual would effectively address the concerns of the consumer and the operators. At the same time, the key concerns from a regulator's perspective are unlikely to be impacted, as the regulator retains the right to impose penalties or revoke license on non-fulfillment of license terms.

### 38. What should be the validity period of assigned spectrum in case it is delinked from the license? 20 years, as it exists, or any other period

Initially, spectrum and license were linked and awarded for a duration of 20 years and the payment of associated fees was made with the same understanding. In the future, if spectrum is delinked from the license, its validity should be increased from the current duration of **20 years**.

The break even period for newer operators has extended to more than 25 years due to competitive tariff regimes, thus the license validity period of 20 years are insufficient for the operator to even achieve break even.

As a principle, if delinked all spectrum assignment based on market prices should be for the same number of years as license. This provides for sufficient time to recover investment made in equipment customized for that spectrum, promotes innovation in spectrum usage and is also in tune with the international trend. However, due to the intense competitiveness in the industry which has resulted in significantly lowering ARPUs in India (which are amongst the lowest in the world), the breakeven period for the existing players is expected to be more than 20 years. **Accordingly, the spectrum validity period should be more than 20 years.**

**39. What should be the validity period of spectrum if spectrum is allocated for a different technology under the same license midway during the life of the license?**

It is recommended that the validity of spectrum should be made perpetual.

However, in the case of limited validity of the spectrum, the validity period, if it is allocated for a different technology under the same license midway during the life of the license, should be co-terminus with the original license period. This spectrum is treated as start up spectrum for the new technology and hence should be treated on same terms as start up spectrum for the other technology. It may be noted that in the Indian context, dual technology operators have paid full license fee for securing license and start-up spectrum for alternative technology (CDMA to GSM)

As outlined above, the license fee paid for this spectrum should be proportionate to the duration for which the spectrum has been awarded. For instance if the spectrum was awarded in the 10<sup>th</sup> year of license (where full period was 20 years) then amount due is half of licensee fee. **However, as operators have already paid the full amount, it is recommended that additional license fee be adjusted in future license fees or spectrum charges.**

**40. If the spectrum assignment is for a defined period, then for what period and at what price should the extension of assigned spectrum be done?**

The extension of spectrum assignment could be done on payment of the prescribed fee for the license which should be equal to the reserve price for the recent most auctions held in the 3G space. The license fee charged should not be determined by the auction mechanism since other operators could get into anti competitive and colluding practices in such a scenario, to raise the auction price to unrealistic levels.

**Thus market driven auctions are not suggested to be used for pricing the extension of assigned spectrum**

**41. If the spectrum assignment is for a defined period, then after the expiry of the period should the same holder/ licensee be given the first priority?**

**The holder/ licensee should be given the first right of refusal in case of the expiry of the license period and should have a high expectancy for extension of the tenure of spectrum allocation, subject to fulfillment of the prescribed terms & conditions of the license.** He would be allowed to hold the license by payment of the prescribed fee for the license which would be equal to the reserve price for the recent most auctions held in the 3G space. In the future, once the secondary (trading/ sharing) market becomes active, the license fees can be reserved at the price of the last auction.

Allowing the right of first refusal to an operator for spectrum will enable the operator to continue investing in network and equipment even during the later stages of the spectrum assignment period.

## Uniform License Fee

### 42. What are the advantages and disadvantages of a uniform license fee?

Uniform license fees for all services except internet and IP-I is beneficial for all stakeholders and should be implemented at the earliest opportune time.

Overall it has been observed that the advantages of a uniform license fee far outweigh the disadvantages as it promotes adoption of most efficient technologies and combines the service offering to users. Consequently, the same trend has been witnessed in other countries as well.

One of the major advantage is that the operators can adapt latest technology without any regulatory burden with regards to technology, and give better and advanced services to the customers.

### 43. Whether there should be a uniform License Fee across all telecom licenses and service areas including services covered under registrations?

**There should be a uniform license fee for all telecom licenses and service areas except internet services and IP-1 service providers.**

The rationale for uniform license fee for all telecom licenses and service areas is explained as advantages above. However, the rationale for exempting internet services and IP-1 service providers from the license fee is outlined in the AUSPI letter dated 31<sup>st</sup> August 2009<sup>5</sup> addressed to Chairman, Telecom Commission & Secretary, Department of Telecommunications. The relevant extract is reproduced below:

#### **Impact of imposing license fee on IP I Service Providers:**

The setting up of passive infrastructure like towers or dark fiber is not a telecom activity requiring any license. Even under the present scheme, the tower structure is being allowed by non-licensed third parties under the process of registration. Setting up of passive infrastructure by third parties is an international phenomenon to increase operational efficiency and not a case specific to India to save license fee. Few well known international tower companies include American Tower, Crown Castle etc. Imposition of license fee on passive infrastructure companies would increase cost for providing telecom services and may also discourage infrastructure sharing. In the interest of increasing affordability, promoting investment in passive infrastructure and infrastructure sharing, and avoiding legal complications license fee should not be imposed on IP I service providers.

**However if IP 1 service provider is allowed spectrum sharing any time in the future, then the IP 1 service provider should also be part of License fee.**

#### **Impact of imposing License Fee on Broadband and Internet Services**

- Imposition of license fee on Internet and Broadband could have an adverse impact on its expansion. It is widely recognized that internet is catalyst for economic and social development of a country. Availability of broadband services at affordable price levels contribute to higher GDP growth rates, provide for a larger and more qualified and informed labour force, and make that labour pool more efficient. Broadband is an extraordinarily transformative technology which can

fundamentally change lives of many individuals. This service can help address many of our nation's most pressing challenges in health-care, education, job creation and economic development.

- The Broadband Policy, 2004, fixed a target of 20 million broadband connections and 40 million internet connections by the year 2010. However, the rate of growth has not picked up and the current levels of internet and broadband penetration are only 13.54 million internet connections as on 31 March 09 and 6.80 million Broadband connections as on 31st July 2009. The country is way off the targets set up in 2004 mainly because broadband is not available and not affordable.
- The wireless broadband is most viable option to expand reach of internet services. However, with BWA spectrum being auctioned, the input costs are likely to increase for internet service provider. Imposition of license fee would make this service totally unviable.
- The Broadband policy [para 4.4 as follows] recognizes that this service can expand only if services are offered at affordable rates and the DoT will work out a financial package to make these services affordable. However, any proposal to impose license fee on internet service will be against the government objective of promoting broadband and internet services.
- Considering the overall objective of providing affordable broadband services and pushing Internet and Broadband to catalyze economic and social development of a country, there should not be any license fee on internet and broadband services.

#### 44. If introduced, what should be the rate of uniform License Fee?

**Uniform license fee should be not more than 6% (including USO levy) of AGR.** The rationale for the same is outlined in the AUSPI letter dated 31st August 2009 addressed to Chairman, Telecom Commission & Secretary, Department of Telecommunications. The relevant extract is reproduced below:

- The uniform license fee on all services except internet & IP-I should not be more than 6% (including USO levy). The government revenues are unlikely to be impacted due to expanding telecom market and growing revenues. In this regard, we would like to highlight for your consideration, the following factors which merit your consideration and justify reduction of license uniformly to 6%. .
- License Fee should recover only Administrative Costs
  - The TRAI in its number of recommendations has stated that the telecom services should not be treated as a source of revenue for the Government. The license fee should recover not more than the requirement of Universal Service Fund (USF) and administrative cost for managing, licensing and regulating the sector. Imposing lower license fee on the service providers encourages higher growth, further tariff reduction making service more affordable which increases service provider revenues. With increased growth, it is a win-win situation for the industry and the Government. Presently, in addition to license fee, consumers are also bearing cost of spectrum charges and service tax. The total regulatory levies and taxes are already very high and are expected to increase further with the introduction of GST. **Therefore, it is suggested that the license fee should not be increased. The flat rate of license fee rate of 6% for all services except internet services and IP-I service providers is appropriate.**

- Reduced requirement of contribution towards Universal Service Obligation levy
  - **Service providers contribute towards USO Fund a uniform levy of 5% of the AGR. The levy at one point of time was necessary to subsidize service providers to rollout services in rural and remote areas. With the expansion of mobile services, the growth is now seen mostly in the rural and remote areas and thus contributing to the objective of bridging the digital divide.**
  - The USO Fund corpus is growing on year on year basis and USO Fund collection far exceeds the disbursement. The current USO Fund corpus is of more than INR 14000 crores.
  - **The USO levy should be in line with the universal service objectives and actual requirements. Further, contribution for the USO Fund is ultimately passed on to the consumer and therefore excessive levy of license fee is not in the consumer interest. At this stage there is strong case to reduce the USO levy from 5% to 2%.**
- Impact of GST on Government Revenues
  - By introducing GST, the government revenues from telecom services will increase many folds as the GST rate is expected to be more than service tax, VAT etc. **Since GST rate is expected to be more than service Tax, consumers would have to bear burden of higher government levies. Therefore, the government should consider reducing license fee so that consumer is not adversely impacted and services remain affordable.**
- Impact of Higher License Fee on Competition
  - Higher uniform license fee will have disproportionately effect on various licensees. While it may appear on the surface that levy is even-handed and proportionate but new operators will be hard hit with the increase in regulatory cost. Lower margins at disposal of new operators would impact investment plans which will impact their capability to compete effectively with the established operators. Higher license fee may force exit of few new operators especially those who are paying only 6% license fee and would have to pay higher license fee equivalent to more viable category A circles and metro cities.
- Adverse impact on investment plans in Circle B and C
  - Government had imposed lower license fee in Circle B and C to provide incentives for investments and faster rollout of services. Lower license fee also pushed many players in B and C circles although these markets are less lucrative. The proposed 9% license fee on circle B and C which are currently paying 8% and 6% respectively will have adverse impact on investments by telecom players, especially new players. It may also be noted that UASL operators willingness to connect the unconnected will be adversely affected due to increase in license fee for circle Band C.

**In view of the above, it is suggested that**

- i) License Fee should not be a source of revenue for the government and License fee should only recover USOF contribution and administrative costs.**
- ii) Uniform License fee is welcome but it should not include internet services & IP-I service providers.**

- iii) Uniform License Fee rate should not be more than 6%.



## Spectrum Assignment

45. If the initial spectrum is de-linked from the license, then what should be the method for subsequent assignment?

It is recommended that the license and initial spectrum assignment be de-linked in the future, in line with the global trends.

The view on subsequent assignment of spectrum needs to be considered separately for the scenario's given below:

### *1. Meeting the existing spectrum requirement as per the committed spectrum in the UAS license*

First priority for spectrum assignment should be fulfill the committed spectrum as covered in the UAS License agreement i.e. 6.2 + 6.2 MHz for GSM and 5 + 5 MHz for CDMA. These limits have been determined to ensure efficiencies of operations and catering to a sizeable/ addressable subscribe base, as also delineated in Section 2.2. (response to Q.2).

### *2. Additional allotment beyond the committed spectrum in the UAS license*

**Subsequent spectrum allocation (beyond the committed spectrum as per the license) should be auctioned and the pricing determined through a market driven approach,** This shall ensure that the spectrum gets rightly priced by the market forces, depending on the operator's need and the value they are ready to pay.

There is a need to adopt a multi-stage auction process to ensure level playing field

- Initial filtration: To identify operators with genuine need for additional spectrum based on weighted parameters including quantum of current spectrum allocation, spectral efficiency, fulfillment/ commitment to the rollout obligation, network coverage offered, in addition to enhanced SLC. **The SLC criterion should take into account the number of active customers and the peak traffic minutes of usage during the month based on the data from operator's Visitors Location Register (VLR) and other systems, rather than be purely based on the subscriber numbers reported by the operators.**
- Second filtration: Selected participants would be eligible to participate in the auction. The auction fee structure should continue to have 2 components – an upfront fee and a recurring annual spectrum usage charge. The proportion should be decided after due consideration of the following key aspects
  - Incumbent operators are better placed to pay higher upfront auction fees as they have healthier financial standings having recovered part of the initial investments. This could result in an imbalance in the auction process in favor of the incumbents and may adversely affect newer entrants. **Accordingly, lower weightage should be assigned to the upfront auction fees**
  - As per the laws of Spectral efficiency : 'as the amount of deployed spectrum increases, the capacity of a network to carry traffic increases in a greater proportion than the proportion of increase in spectrum'. Therefore, as subsequent spectrum is allotted it will provide higher spectral efficiency opportunities for the operators. **Accordingly, the rate of increase in the annual spectrum usage charges should be higher as the quantum of spectrum allocation increases with any operator**

## Conclusions

- i) **Priority should be to ensure all operator's receive the spectrum as committed in the UAS license i.e. 2 X 6.2 MHz for GSM and 2 X 5 MHz for CDMA**
- ii) **Additional spectrum, as it becomes available, should be allocated based on a multi-stage auction process – 1<sup>st</sup> stage being the participants filtration stage and 2<sup>nd</sup> stage being the auction itself**
- iii) **Auction fees should have lower weightage on upfront fee**
- iv) **The rate of increase in annual spectrum usage charges should be higher as the quantum of spectrum allocation increases with any operator**

**46. If the initial spectrum continues to be linked with license then is there any need to change from SLC based assignment?**

**It is recommended that the initial spectrum allocation be de-linked from the UAS license in the future.**

- The anomaly of initial allotment of spectrum between GSM and CDMA needs to be corrected immediately. GSM operators are given initially 4.4 MHz of spectrum and on one step by meeting certain criteria's they get 6.2 MHz of spectrum. Where as in the case of CDMA operator initially only 2.5 MHz of spectrum is awarded, and they have to go through two steps, to go upto 5 MHz of spectrum, which incidentally is the ceiling as prescribed in the license conditions. This anomaly should be corrected immediately, and CDMA operators should be given 3.75 MHz of spectrum initially itself as being given to GSM operators to maintain level playing field.

Further, it is imperative that a standard policy be adopted for spectrum assignment in the future. In the past subsequent allotment for spectrum (beyond the committed spectrum as per the UAS license) has resulted in several operators being allocated spectrum to the tune of 10 + 10 MHz, which has been done pursuant to the SLC criteria.

There are inherent challenges in assigning spectrum solely based on SLC6, which would continue to exist irrespective whether the initial spectrum is linked or not linked to the license, including

- Determination of SLC becomes highly complex and contentious in light of the numerous technological advances and the resultant efficiency gains. As per several reports, technological innovations have the potential to increase the current capacity as much as 7 times leading to higher spectrum efficiency.
- SLC calculation is an average for an entire service area that includes dense urban, urban, semi-rural and rural. There are significant difference between rural and urban subscriber growth and spectrum utilization. So while the spectrum may be short for some operators in dense areas, it may still be sufficient for rural areas.
- SLC deters the expansion of data-centric services. Spectrum needed for data services to a given subscriber base could otherwise be used to provide voice services to a large subscriber base, making the licensee eligible for more spectrum

- The current SLC criterion is based on band-wise calculation. However, as more operators hold multiple bands and offer varied services across these bands, the complexity for computation of SLC will be further enhanced.
- Going forward, there could be migration of spectrum of higher generations of wireless technology (like 3G and BWA) that are currently being offered in a different band, on the same band in which 2G technology is being offered. Similar sort of migration has been witnessed in European Union to allow GSM operators to use the 900 MHz band for offering 3G services. Therefore, if additional spectrum has been allotted to existing operators in the current 800, 900 and 1800 MHz band without an upfront-fee based on the SLC criteria, this could imply that these operators would be eligible to offer 3G, BWA technologies on the same spectrum that they use for 2G, where other new entrants would have paid much higher price for the spectrum for 3G band. This may effect in creating a non level playing field

**In conclusion, SLC could be used as one of the criteria for initial filtration, however, it should not be the sole criteria for spectrum allotment in the future. It is recommended that spectrum allotment be done based on a multi-stage auction process as highlighted in the response No 45**

**47. In case a two-tier mechanism is adopted, then what should be the alternate method and the threshold beyond which it will be implemented?**

In case of adopting a two-tier mechanism, the Tier1 priority should be given to UAS license holders who have been granted the license but not yet allocated the committed spectrum. It is to be considered that Tier1 allotment of spectrum may still take few years to complete, due to the shortage of available spectrum.

**The Alternate method could be the multi-staged auction process as explained earlier.**

**The threshold beyond which Tier 2 allocation should be implemented is after all the licensees have been assigned the committed spectrum of 2 X 6.2 MHz for GSM and 2 X 5 MHz for CDMA**

**48. Should the spectrum be assigned in tranches of 1 MHz for GSM technology? What is the optimum tranche for assignment?**

Spectrum allocation can be considered in the tranches of 1 MHz for GSM and 1.25 MHz for CDMA. Network deployment in these tranches would yield optimal efficiency as it provides for significant additional subscriber base support, especially in the scenario where frequency hopping and capacity enhancing advanced techniques are being deployed by the operators in their networks.

**49. In case a market based mechanism (i.e. auction) is decided to be adopted, would there be the issue of level playing field amongst licensees who have different amount of spectrum holding? How should this be addressed?**

It may be noted there are some licensees who have additional spectrum holding beyond 2 X 6.2 MHz for GSM and 2 X 5 MHz for CDMA. This spectrum has been provided to them without any upfront fee or charges. **A simple auction process could create the following issues of level playing field amongst licensees with different amount of spectrum holding**

- Operators with higher amount of spectrum holding have significantly reduced upfront capital cost coupled with capacity for servicing a larger subscriber base.

Further, most of these operators have been in the industry for a long time and have capitalized most of their initial roll-out investments and even started obtaining returns on these investments. **Such operators are at a financially advantageous position vis-à-vis others** who still have less than 2 X 6.2 MHz for GSM and 2 X 5 for CDMA spectrum allotment

- As per the laws of 'spectral efficiency' – 'as the amount of deployed spectrum increases, the capacity of a network to carry traffic increases in a greater proportion than the proportion of increase in spectrum'. This implies that operators who have spectrum beyond 2 X 6.2 MHz for GSM and 2 X 5 MHz for CDMA will gain much more in capacity with every incremental block of spectrum as compared to operators that have lesser spectrum. Hence, **it makes financial as well as business sense for the operators with higher spectrum allocation to place higher bids for additional block of spectrum**, thereby disrupting the level playing field
- **We recommend following steps to be taken to address the above mentioned issues**
  1. **Re-farm additional spectrum** held by operators beyond the committed spectrum as per license. (discussed in response to Q. 3 sub-topic 'refarming from private operators')
  2. **Implement a multi-staged auction process:** Operators with higher amount of spectrum holding can be filtered at the 1<sup>st</sup> stage, to prevent from participating in the auction

**High annual spectrum usage charges:** The rate of increase in annual charges should be much higher as the quantum of spectrum allocation increases with any operator. This is to align with the philosophy of – "More we use, More we pay"

**50. In case continuation of SLC criteria is considered appropriate then, what should be the subscriber numbers for assignment of additional spectrum?**

**We recommend discontinuation of SLC as the sole criteria for spectrum assignment.** However, in case the SLC criteria continues to prevail, following points should be taken in consideration

- The measurement of subscriber base should not be based on the overall subscriber numbers. Instead it should look at **active subscribers and peak traffic usage averaged over a month in the operator's Visitor Location Register (VLR)** - as also recommended in the WPC letter dated 29<sup>th</sup> March 2006
- Since the incremental spectrum allocation is being considered in the tranches of 1 + 1 MHz for GSM and 1.25 + 1.25 MHz for CDMA, the **SLC would need to be accordingly modified for an incremental band of 1 MHz for GSM and 1.25 MHz for CDMA**
- **The SLC should not be a static criterion.** It would continue to change as technology advancements are realized and thereby the spectrum efficiency and capacity keeps on improving. For example, it has been reported in the media that certain Chinese Telecom operators support 2.5 times the number of subscribers for each MHz as compared to India. Hence, there should be a mechanism to periodically review the SLC to ensure that operator's work towards enhancing spectral efficiency

While we recommend that the subscriber numbers would need to be changed and constantly reviewed, the revised subscriber number requirements and appropriate measurements would require detailed technical analysis.

**51. In your opinion, what should be the method of assigning spectrum in bands other than 800, 900 and 1800 MHz for use other than commercial?**

Spectrum is a scarce national resource and its efficient utilization must be facilitated. Some frequency bands are required for public safety, defense and others strategic purposes and therefore, cannot be directly equated with commercial use spectrum. However, it is imperative to enhance and ultimately optimize the efficiency of spectrum used for these non-commercial purposes, thereby freeing up commercially allocable spectrum. It is recommended that the true value of the spectrum resource can be realized only if there is an associated cost for its use, which could be discounted for an initial fixed time duration.

In addition, there is a need to look at the opportunity cost of making the spectrum available for commercial use. This would also indirectly lead to economic development through efficient use of a scarce natural resource, greater consumer coverage at more affordable rate, in addition to higher revenues to the exchequer, which can be ploughed back into the economy.

Accordingly, it is imperative to introduce focused efforts towards ensuring and enabling optimal use of spectrum, across all bands. There are 2 options available for such assignment –

**Assessing re-deployment of spectrum for commercial use : the key work steps include**

- Categories of spectrum that can be used for commercial services outside the current available bands should be enumerated based on international practices as well as opinion from technical experts. This can be termed as the Potential Addressable Spectrum (PAS)
- All the current sectors where PAS has been allocated should be listed. The nature of non-commercial usage should be highlighted e.g. defense, public safety, air navigation etc
- Independent committee to study the spectrum requirement for the sector, agency keeping in the mind the future development for next 10-15 years. Decision for re-farming opportunity to be provided by the committee
- Negotiate and agree with the concerned government agency the costs and timelines to be incurred for the re-farming
- Compensating the agency partially, if required, from the auctioning fees (of the re-farmed spectrum) and subsidy from the budgetary allocation

**Method of assigning spectrum for use other than commercial**

- Levy spectrum usage charges, even if it's for non-commercial use to ensure efficient utilization of spectrum. Since the spectrum is being used for non-commercial services, the spectrum charges can be determined as a one time effort, subject to revision every 3-5 years

In conclusion, focused efforts should be made to refarm any excess spectrum towards commercial usage. Till such time refarming is not feasible, a spectrum usage charge should be levied on these non commercial users to ensure optimal spectrum utilization.

## Spectrum Pricing

**52. Should the service providers having spectrum above the committed threshold be charged a one time charge for the additional spectrum?**

There is an inherent need to ensure that the scarce spectrum resource is equitably distributed across the players in the industry as holding of spectrum above a committed threshold could offer significant advantage to service providers – both in terms of competitive positioning and profitability. Levy of one time financial charge for spectrum above the committed threshold could be an alternative mechanism for spectrum hoarding. However, it does not permanently address the underlying quest for competitive markets and equitable distribution.

We strongly advocate that spectrum beyond 6.2 MHz in case of GSM and 5 MHz in case of CDMA should not be allocated to any operator, and Government should take away the surplus spectrum that has been allocated beyond 6.2 MHz. Till such time the operators do not surrender, the operators should be charged as per the following retrospectively from the date of allocation.

The Government should charge yearly fees of Rs. 300 Crs/ per MHz of spectrum for Metros and "A" Circles and Rs. 200 Crs / per MHz of spectrum for "B" Circles and Rs. 200 Crs/ per MHz of spectrum for "C" Circles apart from additional usage charge of 3% per MHz/ per year based on AGR, retrospectively from the date of allocation of additional spectrum.

The operators have raked huge profits due to these additional spectrum allocations, and to maintain level playing field these operators should be asked to pay up immediately, as they are enjoying the benefits without paying any additional charges.

**53. In case it is decided to levy one time charge beyond a certain amount then what in your opinion should be the date from which the charge should be calculated and why?**

The one time charge should be levied from the date of spectrum assignment since the benefits of extra spectrum have been accrued to the operator since the date of assignment of the spectrum.

**54. On what basis, this upfront charge be decided? Should it be benchmarked to the auction price of 3G spectrum or some other benchmark?**

Benchmarking the upfront charge to the auction price of 3G spectrum might not be the most optimal measure for determining the price of the upfront charge. Market value of 3G spectrum is based on the cost of and profitability expectation from the efficient usage of the 3G spectrum. Since the 3G spectrum is expected to be used for data transactions to a large extent, the ARPU for 3G would be significantly different from the voice based 2G spectrum so far allocated and even the costs would be different than the capital expenditure that has been done so far. In the light of this, there needs to be an alternate basis for computation of this upfront charge.

Since the initial operators were allotted 6.2 MHz of spectrum for INR 1650 Crores, the upfront charges could be computed as follows –

- o Calculate Per MHz spectrum charge for additional entry fee for spectrum beyond license mandated 6.2 MHz for GSM

- o Divide the entry fee of INR 1650 Crores by 4.4 MHz initial allocation (INR 1650 Crores / 4.4 MHz = Rs.375 Cr per MHz.)
- o INR 1650 Crores should be divided by 4.4 MHz since Initial allocation from 1995 till today is 4.4 MHz, although in some cases it has been 6.2 MHz

Indexation of this amount from 2003 till today would require to be undertaken in the following method

- Let the extra spectrum beyond 6.2 MHz given from 2003 onwards be 'S'
- 3 possible figures could be taken for indexing –
  - GDP Growth
  - SBI PLR
  - Increase in telecom revenue
- Of these, the increase in telecom revenue would be able to best capture the value that has been derived from the extra spectrum, thus the index should be increase in Telecom Revenue. Let, this increase in revenue be 'I' (a multiplicative factor)
  - o Thus the total payment becomes  $S*I$  = Upfront Charge

Also, taking into consideration the 900MHz frequency band being more efficient for multiple services, the charge for 900MHz frequency band should be significantly higher than the 1800 MHz band.

#### **55. Should the annual spectrum charges be uniform irrespective of quantum of spectrum and technology?**

The annual spectrum charges are suggested to be technology neutral but not uniform irrespective of the quantum of spectrum.

The technology neutrality in spectrum must be allowed, in line with global practices as there is a trend towards adopting a policy of technology and service neutral licenses.

The quantum of spectrum on the other hand, has a major role to play in providing better services to the consumer without incurring additional capital expenditure to provide a comparable level of services with lower spectrum. This, in turn, would positively impact the ARPU of the operator and could provide an unfair advantage to the holder of the larger quantum of spectrum.

Accordingly, annual spectrum charge should be directly dependent on the total quantum of spectrum held by an operator.

The charges should continue to be the way they have been defined, thus upto 6.2 MHz for GSM and upto 5 MHz for CDMA, the charges should continue to be the way they are currently but beyond 6.2 MHz in GSM and beyond 5 MHz in CDMA, there should be a steep increase in the annual spectrum charges.



**56. Should there be regular review of spectrum charges? If so, at what interval and what should be the methodology?**

**Spectrum charges should be reviewed periodically. Three years is considered to be optimal interval for review, given the ongoing evolution and maturity level of the industry. However, adhoc reviews might also be warranted, especially in the instance of any significant underlying change in the industry.**

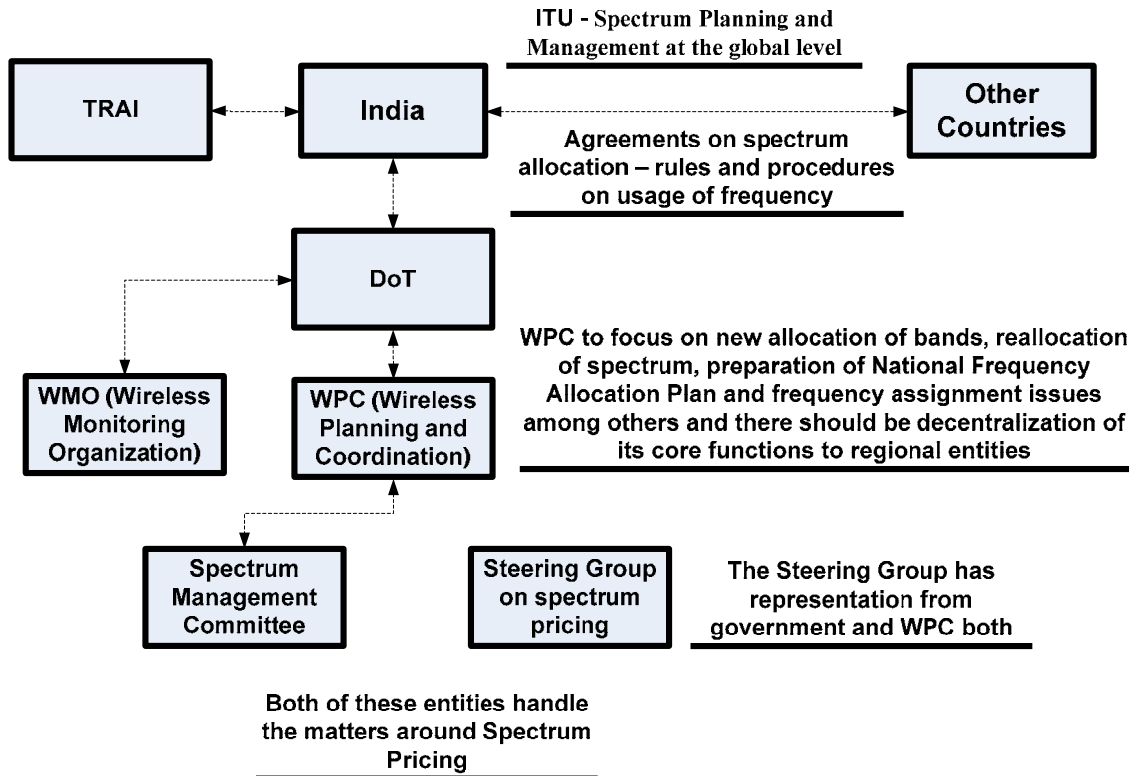
Metrics could be defined for efficient usage of spectrum which could include fulfillment of roll-out obligations, target membership base, number of services provided, quality of consumer services levels maintained, etc. Non fulfillment of any/ all of these conditionalities, resulting in inefficient use of spectrum could warrant an upward revision of the spectrum charges and/ or levy of penalties, and even refarming of spectrum on continual non-fulfillment.

The review procedure should be focused on promoting efficient and optimal use of the scarce spectrum resource. The objective should not be penal in nature, as it could result in an undue burden on the operator,, which could result in increase in the end consumer charges.

# Structure for Spectrum Management

57. What in your opinion is the desired structure for efficient management of spectrum?

The present structure is as displayed below -



With increasing participation of private operators in the Indian Telecom Sector and the underlying imperative of ensuring efficient utilization of the scarce national spectrum resource, there is a requirement for greater independent monitoring and regulatory oversight. These requirements necessitate select modifications needing to be made in the structure, which would be required to undertake the key activities.

Role	Entity	Function	Modification to operating model
Interface to the global entities	None	Interfacing with the global entities for spectrum policies in consultation with global policies	Establishment of an independent body to interface with the International authority on Spectrum Planning and Management (ITU)
Spectrum Allocation, Assignment and Usage	WPC (under DoT)	Spectrum management including allocation, refarming, handling new frequency bands	Increased representation from private entities and enhanced transparency in the formulation of rules and processes around allocation and usage of frequency. Industry Associations should

		etc	become a part of WPC and there should be regular meetings of the same The details of spectrum and available spots across the license areas must be made available on the website There should also be time targets that should be set to ensure faster clearances of spectrum
<b>Spectrum Pricing</b>	TRAI along with Spectrum Management Committee	Identifying the tariff and charges to be levied on the operators to ensure most efficient usage	To be continued as it is
<b>Monitoring</b>	WMO – Wireless Monitoring Organization	Monitoring the spectrum utilization	To be continued as it is.

Thus, there is a need to increase transparency in the existing regulatory framework along with increasing participation from the Industry associations.