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Telecom Regulatory Authority of India  
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New Delhi – 110 029  
Kind Attention: Advisor (MN)

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**Your reference**                      **Consultation Paper no. 11/2004**

**Subject**                                  **Spectrum related issues: Efficient Utilisation,  
Spectrum Allocation, and Spectrum Pricing**

Dear Sir,

Radio spectrum is a natural resource endowed to all the nations with the same quantum. Like wind and clouds, radio waves defy and criss-cross across the political boundaries. Importance of spectrum for sustainable growth of telecom services cannot be overemphasized.

We appreciate that though the TRAI Act 1997 (as amended by the TRAI Act, 2000) does not vest the spectrum management with the Authority, the government has sought TRAI's recommendations on three key aspects of spectrum management, namely the following:

- 1 Efficient utilization of spectrum**
- 2 Spectrum Allocation Procedure**
- 3 Spectrum Pricing**

To these 3, TRAI has added 2 aspects, viz.

- 4 Policy on spectrum surrender**
- 5 Re-farming (surrender & re-allocation)**

This consultation is very timely and apt. On one hand, the Authority has projected that the wireless phones would outnumber the fixed ones in the country within this year and the spectrum management authority (WPC) is reviewing the National Frequency Allocation Plan.

On the other hand, the Authority is well aware that there has been little change in the spectrum pricing for 'other users' though admittedly, the pricing for spectrum has undergone significant structural and valuation changes with respect to the wireless access licenses (currently, classified as 'Unified Access Service Licensees'). Though mobile phones are the most visible and oft-quoted examples of use of wireless in the telecom context, wireless access systems can revolutionise growth, affordability, quality and usage of ICT (Information & Communications Technology) as well.

It must be pointed out that while government had sought TRAI recommendations on spectrum 'allocation' which hopefully be taken into account in the context of ongoing NFAP (National Frequency Allocation Plan) review, the instant consultation paper by and large, focuses on the issues pertaining to spectrum 'assignment'. It is not clear whether TRAI recommendations would be a pre-requisite to the ongoing exercise of NFAP review or whether the NFAP would be finalized and be effective only after TRAI's recommendations are taken into account. Since this exercise is devoid of a wider context, the outcome is also likely to be impacting just a few niche users.

The Authority has recognized the importance of wireless for growth of Internet and Broadband in the country and accordingly, made some path-breaking recommendations as part of the comprehensive set of recommendations released on 29 April 2003. May we hereby suggest that the same be pursued and reiterated in the recommendations – due from the instant consultation exercise.

In view of the foregoing, we would invite the attention of the Authority towards some fundamental issues and aspects related to **overall** spectrum management:

- 1 The Authority must take a holistic view of spectrum management and appraise best international practices and their aptness in the Indian context
- 2 The Authority should develop a roadmap for spectrum allocations and the challenges therein with respect to the Radio Regulations already in vogue as well as with respect to the ongoing work of ITU-R
- 3 The Authority should consider de-licensing as a genuine impetus for innovation, particularly for broadband (WiFi, Wimax, etc), short range radios, wireless toys, cordless microphones, cordless telephones, etc.
- 4 The Authority should prescribe time-frames and norms for transparency in frequency assignments, siting clearances and grant of licenses
- 5 The Authority should mandate spectrum usage charges by all users and on an equitable basis – including the government agencies and departments. This would go a long way in incentivising efficient and effective usage of spectrum.
- 6 The Authority should start work on a roadmap towards development of secondary markets for spectrum by converting existing telecom licenses to spectrum licenses with 'property rights' and/or 'a shared resource for the commons'.

Based on the above principles, our detailed comments are enclosed. We sincerely believe that the Authority would consider our inputs and responses in the perspective. We keenly look forward to comprehensive and forward-looking recommendations and their acceptance & subsequent implementation.

Anil Prakash  
Secretary General

Enc. Detail Response

## Chapter 1 General Comments on the spectrum

Mobile communications have changed the way we as human beings live and work on this planet. These technologies offer a breakthrough in services optimized for high-speed data; mobile Internet and applications based on Intranets, extranets and mobile multimedia. Mobile tariffs in India are the lowest in the world, which is driving up volumes. With lowest wireless telecommunications cost in the world to its consumers, India is expected to be the third-largest market in Asia after China and Japan. With more than 1.5 to 2 million new mobile subscribers being added every month, the Indian wireless subscriber base is expected to reach 100 million by end of 2005, compared with 40 million today –a threefold increase! It is necessary that appropriate and adequate spectrum is available to sustain the envisaged growth

Radio Frequency Spectrum is a very valuable but finite natural resource. Unlike other natural resources such as oil, this resource is not consumed but is wasted if not used. The demand for Radio Frequency Spectrum is growing enormously due to both increasing communication needs and the impact of new technologies, Even though India has as much amount of spectrum as any other country, it is greatly lagging behind even comparable developing economies in the matter of public telecommunication facilities. With the telecom technologies moving towards a wireless age, major growth in the telecom facilities depends largely on the availability of Radio Frequency Spectrum.

Efficient use and planning of the Radio Frequency Spectrum is a key factor in increase of teledensity and growth of GDP. To facilitate accelerated economic development, India therefore needs to aggressively increase tele-density through adequate Radio Frequency Spectrum for telecommunication purposes. Wireless communications networks can be rolled out more expeditiously than wire-line networks and also involve lower investments if the regulatory impediments could be removed. Hence it is appropriate for India to accord a high priority to wireless communication services.

It is also noted that the consultation paper is limited to some key issues relating to spectrum but does not cover the whole gamut of issues relating to various radio based services efficient spectrum management, allocation, authorisation, pricing, assignment, etc. Many questions in this paper are limited to the access spectrum for access of GSM and CDMA only. Our current response is primarily limited to these issues even though we have tried to bring in some related aspects. It is also to be noted in this context that the spectrum management mechanism is required to be considered in a broader perspective taking into account requirements of other wireless services and users with wider participation of all interested parties.

It is also necessary that the regulatory authority should be and more should appear to be impartial and unbiased. Certain references, e.g. the statement regarding next band for expansion of GSM and CDMA in 1800 MHz/1900 MHz without adequate national discussion gives an inappropriate impression.

The following Key Issues need be addressed in the area of spectrum management.

1. Need for additional spectrum by the Telecom Industry
2. Rationalisation of spectrum prices including reduction in the spectrum prices for the public telecom operators and uniformity in spectrum pricing for all users
3. Streamlining the role and constitution of SACFA

4. Greater participation by the private sector in spectrum management issues
5. Rationalization of spectrum management process –Computerization, delicensing and faster approval

## **Chapter –2 Current Spectrum availability and requirement'**

**Chapter – 2.9 (i) :- Should the 450 MHz or any other band be utilized particularly to meet the Spectrum requirement of service providers using CDMA technology.**

**Ans:** It is felt that 450 MHz band may have applicability, especially in rural areas. Further any use of this band should be technology neutral. It may however be noted that this band is not a globally harmonized band for mobile services, which adversely affects the benefits of economies of scale, wide competition and restricts the roaming aspect.

Any other band to be considered for meeting the requirements of service providers should only be based on National Frequency Allocation Plan.

**Chapter –2.9 (ii) :- The Consultation paper has discussed ITU method for assessment of spectrum requirement.**

**Ans:** The ITU methodology was created for ITU to estimate the total quantum of spectrum demand for IMT – 2000. This methodology has been based on a good number of initial assumptions and suits such general type of calculations, like the requirements of spectrum for carrying assumed total estimated traffic for a place/ specified geographical area, etc and can not be used to assess individual operator requirements.

The requirements of spectrum by different users will need to be provided by various user organisations, based on market survey and other related studies.

It is noted in this context that the government has considered this issue through various mechanisms including expert committees for certain relevant technologies and have arrived at certain policy decisions which should be followed unless there are certain other comprehensive studies undertaken.

**Chapter-2.9 (iii) :- Whether IMT- 2000 band should be expanded to cover whole or part of 1710- 1785 MHz/ paired with 1805- 1880 MHz.**

**Ans:** The frequency bands identified by WARC -92 are the bands identified in the NFAP for implementation of IMT 2000.

The bands 1710-1785 MHz paired with 1805- 880 MHz was identified as an IMT-2000 band by WRC – 2000, along with 806- 960 MHz and 2500 – 2690 MHz bands. ITU-R is working out the implementation of these bands through its working party 8-F and India can consider them only after these recommendations are finalised by ITU. Further, the equipment is not likely to be available in these extended bands in near future. It is to be noted that the availability of equipment for WARC 92 bands took about 10 years.

**Chapter –2.9 (iv) :- Should IMT 2000 spectrum be considered as extension of 2G mobile services and be treated in the same manner as 2G or should it be considered separately and provided to operators only for providing IMT 2000 services?**

**Ans:** Internationally all countries have licensed 3G services as a separate licensing process. India should follow similar international practice.

**Chapter –2.9 (v) :- Reorganization of spot frequencies allotted to various service providers so as to ensure the availability of contiguous frequency band is desirable feature for efficient utilization of spectrum.**

**Ans:** Contiguous frequency band allocations bring better network design/ planning, more flexibility in the network operations, and supports lower operational costs with increased spectral efficiency. Therefore we fully support the ongoing reorganization / review of current service providers' spot frequencies initiated by the Government.

**Chapter –2.9 (vi) :- Whether the band 1880 – 1900 MHz be made technology neutral for all BSOs/ CMSPs/ UASLs and be made available with the pair 1970-1990 MHz or should it be kept technology neutral but reserved for TDD operations only.**

**Ans:** The band 1880 – 1900 MHz should be limited to TDD operations only, should be technology neutral and should not be paired with any band. Such pairing will also tamper with the ITU band allocation for IMT 2000 and will not be in line with the ITU -R Recommendations.

**Chapter –3**  
**'Technical Efficiency of Spectrum Utilization'**

**Chapter – 3.3 (i) :- Please offer your comments on the methodology outlined in this Chapter for determining the efficient utilization of spectrum.**

**Ans:** It is not considered prudent to categorise one technology better and more efficient than the other since it depends on various factors, assumptions and situations including, inter alia, network architecture, number and type of sites, etc. Comparison of radio technologies is difficult and complex. In some cases GSM may be more efficient and in other cases CDMA. The theoretical calculations can be made to look in favour of one technology or the other, based on the assumptions. We feel that it is rather difficult, if not impossible, to fairly judge as to which globally acclaimed radio technology was more efficient. It could better be left to the market forces to determine which technology was more efficient and to choose for deployment.

**Chapter – 3.3 (ii) :- Likely use of data services on cellular mobile systems and its likely impact on the required spectrum including the time frame when such requirements would develop.**

**Ans :** It should be noted that all current cellular mobile systems/technologies/operators already provide data services. Spectrum requirements already take into account the needs of voice, data as well as other services and therefore there is no need for taking the spectrum needs of the data services separately.

## Chapter 4 Spectrum Pricing

### Introduction:

There are some basic principles to bear firmly in mind when we consider alternatives for spectrum pricing. These include:

1. Spectrum is a finite natural resource. It is wasted, if not used
2. Spectrum does not recognise national boundaries and the planning and the coordination task has an international component to proper national spectrum management.
3. Spectrum is **potentially** a very valuable resource, but unused it has no value - only potential value.

It follows from the above simple but axiomatic statements that we should plan the use of the radio spectrum carefully - both nationally and internationally; Get spectrum into use in the most efficient way possible and as quickly as possible; Develop and implement license fee structures which encourage the efficient use of the spectrum and which expand rather than discourage its use. To do these things requires both equipment and highly trained staff, and this costs money.

?? Who should pay? - The public at large? - The user?

?? How much should they pay and why?

These are the basic questions of spectrum pricing.

We recommend the following guiding principles of spectrum pricing:

1. A uniform spectrum pricing policy for all users including various government and private users should be adopted.
2. The spectrum pricing should not be aimed at raising revenue.
3. The spectrum price should provide sufficient resources to meet the cost of spectrum management
4. The spectrum pricing could be used as one of the tools to ensure efficient usage of the frequency spectrum.
5. The spectrum needs of social development sectors should receive special consideration.
6. In order to ensure efficient utilization of the spectrum and to discourage hoarding, it is strongly recommended that all users of the spectrum including govt. departments, both commercial and non commercial must pay for the spectrum at same rates just as they pay for other services such as telephones and electricity.



7. Public sector services providers such as railways, seaports, airports need to be charged for spectrum on the same lines as private operators to ensure equal competition.
8. Public welfare and community services such as police, fire services, municipal services, defence services and other non commercial users should pay a nominal charge to ensure that they use the spectrum in a most efficient manner. However, even in their case, the use of commercial spectrum in identified bands should be charged on the same basis as private and public operators using those bands
9. A uniform spectrum pricing policy for all users including various government and private users should be adopted. The spectrum pricing should not be aimed only at raising revenue but should also ensure an efficient usage of the frequency spectrum. The spectrum needs of social development sectors could receive special consideration by the government.
10. In order to ensure efficient utilization of the spectrum and to discourage hoarding, it is strongly recommended that all users of the spectrum including govt. departments, both commercial and non commercial must pay for the spectrum at same rates just as they pay for other services such as telephones and electricity. All public sector services providers need to be charged for spectrum on the same lines as private operators to ensure equal competition.

**Our response to specific questions is as follows:**

**4.10 (i) Is there a necessity to change from the existing revenue share method for determining the annual spectrum charge?**

AND

**4.10 (ii) If yes, what methodology should be used to determine spectrum pricing for existing and new operators? (Please refer table in Section 4.8)**

**Ans :** The spectrum charge on operators must be very low. The spectrum pricing must be simple and easy to implement. It must promote spectrum efficiency.

The existing revenue share method is a tested and proven mechanism that has worked well and should be continued. However, the percentage of revenue share must be reduced.

**4.10 (iii) In the event AIP is adopted as a means to price spectrum, would it be fair to choose GSM as a reference for determining the spectrum price?**

**Ans :** The AIP approach is not recommended.

**4.10 (iv) Please provide your comments on the assumptions used in A.I.P.**

**Ans :** The AIP approach is not recommended.

**4.10 (v) In case Auction methodology is used for pricing the spectrum, please give suggestions to ensure that spectrum pricing does not become very high and spectrum is available to those who need it.**

**Ans :** Auctions is not recommended.

**4.10 (vi) Should the new pricing methodology, if adopted, be applicable for the entire spectrum or should we continue with revenue share mechanism till 10 + 10 MHz, and apply the new method only for spectrum beyond this?**

**Ans:** The existing revenue share method is a tested and proven mechanism that has worked well and should be continued. Percentage revenue share of a mobile operator may be reduced with increasing number of subscribers, as long as there is no increase in the spectrum assignments.

**4.10 (vii) What incentives be introduced through pricing to encourage rural coverage and / or using alternative frequency bands like 450 MHz?**

**Ans:** Special consideration could be given by the government to enhance rural coverage, which will help accelerate increase in tele-density in rural areas and promote development therein.

**4.10 (viii) Does M X C X W formulae for fixed wireless spectrum pricing need a revision? If so, suggest the values for M, C, W?**

**Ans:**

Before we look at the formula *per se*, we must remember that this formulation was developed when wireless links were basically set up as an alternative to terrestrial cables using directional, high power directional antennae. Presumably, the spectrum pricing was aligned towards the prevailing prices for leased lines.

The leased line prices had come down significantly in 1999 thanks to the TTO, 1999 and recently, the Authority has released another consultation paper, proposing further significant cuts.

Besides, usage of wireless links is shifting more and more towards using low power, point to multipoint access networks with a focus on reuse of the frequency.

Similarly, the prevailing formula does not address the spectrum pricing applicable for mesh networks, which are emerging fast and becoming more and more commonplace. Going forward, there should be a possibility of obtaining such licenses as well (e.g. for a particular city) and plan the network in the most efficient manner rather than designing the same with respect to the applicable royalty on a per BTS basis.

For a certain level of radiated power from a particular design of antenna, the higher is the frequency range of operation, the wider is the typical RF carrier, the higher is the data rate achievable but the distance keeps going down.

Thus, the revised regime should be able to address distances lower than 5 kilometers as well as have more slab ranges.

At the same time, congestion is less in the higher frequency range while competing demand pressure in the lower frequency range is considerably higher. Thus, spectrum pricing should be such that offers incentive for such users / usages reflecting one or more of the following characteristics:

- ?? **Ability to manage with minimum spectral bandwidth**
- ?? **Ability to manage minimum power radiation**
- ?? **Ability to contain minimal harmful interference to others**
- ?? **Ability to sustain interference from others**
- ?? **Ability to reach farther distances without increase in the emitted power**
- ?? **Ability to serve more number of users in a certain territory**
- ?? **Ability / risk in using less crowded bands**

The spectrum pricing should be aligned towards recovering appropriate costs of spectrum management and regulation rather than as a source of revenue to the government.

We would suggest a framework that not only significantly reduces the prevailing royalty in general and aligns the same with the leased line charges but also has finer granularity.

Value of 'x' MHz in 1 GHz band is different from that of 'x' MHz in 5 GHz band which is still different from that of 'x' MHz in the 10 GHz band.

Accordingly, we suggest a review of the formula for computation of spectrum royalty in case of microwave links / networks:

$$R = M \times W \times C$$

'R' is the annual royalty in Rupees

'C' is twice the number of duplex RF channel pairs

<b>Suggested value of 'M'</b>	<b>Applicable Distance (in Kilometers) for Microwave Link(s) / Network(s)</b>
40	0.5
60	1
120	2
200	3
300	5
500	7
750	10
1000	15
1200	25
2400	50

5000	100
10000	250
15000	500
20000	> 500

'W' is the weighting factor computed as:

$$W = \frac{\text{'spectral bandwidth (in MHz) of each carrier x 10'}}{\text{'Frequency band (in GHz) of the carrier(s)'}}$$

Accordingly, value of 'W' would be 100, 50 & 20, depending on whether the carrier is in the '1 GHz band', '2 GHz band' or the '5GHz' band – in case of a 10 MHz bandwidth.

**Besides, there should be no additional license and/or license fee for each remote site / antenna; currently, it is Rs. 1000/- per remote site (Customer Premises Equipment) per annum. The license fee for the cellular handsets and pager terminals has already been done away with.**

**All spectrum prices (royalty) should be payable quarterly in advance rather than annually in advance.**

**It should be possible to pay a single license fee based on a mesh network basis in a particular SDCA to establish access network.**

**We would also suggest that no royalty should be payable for the downlink signal in case of a receive only satellite terminal.**

We believe that such multi-graded, predictable and transparent pricing would incentivise sharing of spectrum as well as motivate the users to manage with the barest minimum spectral bandwidth. It will also enable the users to plan and rollout their links in an optimal fashion, coupled with significant reduction in the attendant paperwork.

**4.10 (ix) Should there be different pricing levels for shared spectrum versus spectrum that is allocated with protection? How should this be determined?**

**Ans:** Spectrum pricing should be based on the fundamental principle of meeting the cost of administration and regulation thereof.

## **Chapter –5 'Spectrum Allocation'**

### **Introduction:**

Wireless communications networks can be rolled out more expeditiously than the wire-line networks and also involve lower investments if regulatory impediments would be removed. To increase the capacity of the network, it is necessary that the adequate spectrum resources are made available for the Industry. Most countries have allocated much higher spectrum for the mobile operators and unless we also allocate similar spectrum, our growth and the quality of service will suffer. The present mobile growth of 1.5 to 2 Million added subscribers every month can be further exceeded provided sufficient spectrum is provided.

Some of the key issues on spectrum allocations other than the mobile services spectrum are:

1. Most countries in the world use wireless technologies for recreation, entertainment, education and industrial growth. There is an urgent need to provide for such services on a delicensed basis.
2. India is becoming a major global hub for IT enabled services (ITES). The current employment of about 5 lakh persons in the ITES sector is expected to grow to over a crore in the next few years. This calls for fast deployment of wireless technologies for indoor and outdoor applications for Internet access using Radio LANS and WANS. For this purpose urgent action is needed for delicensing 5.2 and 5.7 GHz spectrum for indoor as well as outdoor applications on the lines of what has been done in many other countries.
3. Permit unlicensed use of cordless telephony in select bands like 2400 MHz.
4. Rationalization of spectrum management process –Computerization, delicensing and faster approval
- ?? WPC should immediately review and modify all existing procedures of frequency assignment and siting clearance so that these are completed in a faster and time bound manner. The procedures should be transparent, except where national security needs dictate otherwise.
- ?? Time-frames for various activities should be minimal and target turnaround times for different categories should be specified by the government. In this context, UK model could be taken as a guideline in which they specify targets in statistical terms, e.g. 90% cases in a particular category are to be cleared within 30 days.
- ?? The concept of major users such as Defence, P&T, railways etc. was done away with in the NFAP 2000. Therefore, WPC should have full authority and autonomy to assign any available frequency in the best national interest without the need to seek clearance from others.
- ?? Private sector should be fully involved in the national and international spectrum management activities, through a unified representative entity.

**Our specific responses to questions are given below:**

**Chapter – 5.11(i) :- How much minimum spectrum should each existing operator be provided?**

**Ans:** We consider that neither approach I nor approach II is appropriate. The government has already laid down a roadmap for spectrum allocation to the mobile operators based on studies by various expert committees, which should be followed. Regarding IMT- 2000, worldwide deployment for initial spectrum is generally 2 x 15 MHz (paired) and 5 MHz (unpaired).

**Chapter – 5.11(ii) :- At what stage the amount of spectrum allocation to new entrants be considered in the 800 MHz/ 900 MHz/ 1800 MHz frequency bands?**

**Ans:** Priority should be in giving adequate spectrum to existing operators.

**Chapter – 5.11(iii) :- Should spectrum be allocated in a service and technology neutral manner?**

**Ans:** The spectrum allocation should be for a particular service and technology neutral; the licensees should be free to choose technology for deployment, so long it co-exists with the other adjacent users, free of interference.

**Chapter – 5.11(iv) :- What should be the amount of cap on the spectrum assigned to each operator?**

**Ans:** There is no need for a 'generic cap', neither within 2 G spectrum, nor IMT – 2000 spectrum, nor in combination.

**Chapter – 5.11 (v) :- What procedure for spectrum allocation be adopted for areas where there is no scarcity and in areas where there is scarcity?**

**Ans:** The same procedure for spectrum allocation can be used for both areas, keeping in view the alignment with international practice of the government, efficient usage, fair justification, level playing field, fair competition etc.

**Chapter – 5.11(vi) :- Which competitive spectrum allocation procedure (Auction/ Beauty Contest) be adopted in cases where there are scarcity.**

**Ans:** Auction mode is not considered appropriate for a country like India. APT has already recommended against spectrum auctions in Asian countries. The present practise for assigning additional spectrum to mobile operators is considered appropriate and should continue.

**Chapter – 5.11(vii) :- Should we consider giving some spectrum in 900 MHz band to fourth CMSPs?**

**Ans :** Priority should be in giving adequate spectrum to existing operators. However, if spectrum is available for the fourth operator in 900 MHz band, it may be considered.

**Chapter – 5.11(viii) :** The minimum blocks such as 2 X 2.5 MHz/ 2 X 5 MHz of additional spectrum to be allocated to existing service providers in situation where IMT 2000 band is opened as well as in situations where it is not opened.

**Ans:** The IMT-2000 band should not be tampered with. Existing practice should continue.

**Chapter – 5.11(ix) :-** In the event that IMT 2000 spectrum is treated as continuum to 2G, should existing operators using spectrum below the specified benchmark be treated as those eligible for IMT 2000 spectrum?

**Ans:** We support international practice of licensing 3G services as a separate licensing process.

## Chapter 6

### Re-farming, spectrum trading, M & A and Surrender

#### Re- farming of spectrum

**Chapter – 6.4 (i) :- What approach should be adopted to expedite the re-farming of 1800 MHz and IMT- 2000 spectrum from existing users?**

**Ans:** The existing users of these bands should be encouraged for early vacation by migration to other bands and the Government could appropriately compensate them. In this context the report of the Group of Ministers is also relevant.

**Chapter – 6.4 (ii) :- What approach should be adopted for re-farming of spectrum after expiry of license?**

**Ans:** The current licenses of mobile service operators will be valid for many years to come. At this stage, it is too premature to discuss about re-farming after expiry of these licenses.

#### Surrender of spectrum

**Chapter – 6.4 (iii) :- Should there be any refund for spectrum surrender in principle?**

**Ans:** This issue is premature at this stage. Once the basic spectrum issues have been resolved, all issues relating to spectrum trading, surrender etc. can be considered through a separate consultation process.

**Chapter – 6.4 (iv) :- Should there be refund for spectrum surrender consequent to Unified Access license policy? If yes, what should be the basis?**

**Ans:** This issue is premature at this stage. Once the basic spectrum issues have been resolved, all issues relating to spectrum trading, surrender etc. can be considered through a separate consultation process.

**Chapter – 6.4 (v) :- How should the amount of refund be estimated ?**

**Ans:** This issue is premature at this stage. Once the basic spectrum issues have been resolved, all issues relating to spectrum trading, surrender etc. can be considered through a separate consultation process.

#### Spectrum trading

**Chapter –6.4 (vi) :- Should we open up the spectrum market for spectrum trading? If yes, what should be the time frame for doing so?**

**Ans:** This issue is premature at this stage. Once the basic spectrum issues have been resolved, all issues relating to spectrum trading, surrender etc. can be considered through a separate consultation process.



**Chapter –6.4 (vii) :- What are the pre-requisites to adopting spectrum trading?**

**Ans:** This issue is premature at this stage. Once the basic spectrum issues have been resolved, all issues relating to spectrum trading, surrender etc. can be considered through a separate consultation process.

### **Mergers & Acquisitions;**

**Chapter –6.4 (viii) :- Whether we should specify a cap higher than 2 X 15 MHz for Metros and Category "A" service area and 2 X 12.4 MHz for Category "B" and "C" service area in case of M & As or should it be retained?**

**Ans:** There should be no cap on the spectrum allocated to an operator. This issue can be considered once the roadmap for growth of subscribers beyond 15 Lakhs has been agreed by the government.

**Chapter – 6.4 (ix) :- In case, IMT 2000 is considered as continuum of 2G services, is there a need to have a cap higher than that without IMT 2000 services ? Should there be individual caps on 2G and 3G spectrum or a combined cap?**

**Ans:** The IMT- 2000 spectrum should be considered separately from 2G spectrum. There is no need for a generic cap.

**Chapter –6.4 (x) :- In case of M & As where the merged entity gets spectrum exceeding the spectrum cap, what should be the time frame in which the service provider be required to surrender the additional spectrum?**

**Ans:** As mentioned above, there should be no spectrum cap.