



Association of Unified Telecom Service Providers of India

AUSPI/12/2009/ 162

12th November 2009

Dr. J S Sarma,
Chairman,
Telecom Regulatory Authority of India,
Mahanager Door Sanchar Bhawan,
Jawaharlal Nehru Marg,
New Delhi.

**Sub: Response to TRAI Consultation Paper No.6/2009 on
'Overall Spectrum Management and Review of
licence terms and conditions'**

Dear Sir,

Please find enclosed AUSPI's Response to the TRAI Consultation paper on
'Overall spectrum management and review of licence terms and conditions.

We request the Authority to kindly take our views contained in the enclosed
document into consideration while coming out with the recommendation on the
subject.

Thanking you,

Yours faithfully,


S.C.KHANNA
SECRETARY GENERAL

Copy to :

- 1) Shri R. Ashok, Member, TRAI
- 2) Shri R. N.Prabhakar, Member, TRAI
- 3) Prof. N. Balakrishnan, Member, TRAI
- 4) Dr. Rajiv Kumar, Member, TRAI
- 5) Shri R.K.Arnold, Secretary, TRAI
- 6) Shri Sudhir Gupta, Advisor (MN), TRAI

I N D E X

| SNO | SUBJECT | PAGE NO |
|-----|---------------------------------------|---------|
| 1 | BACKGROUND | 2 |
| 2 | SPECTRUM REQUIREMENT AND AVAILABILITY | 3-11 |
| 3 | LICENSING ISSUES | 12-19 |
| 4 | M & A ISSUES | 20-26 |
| 5 | SPECTRUM TRADING | 27-31 |
| 6 | SPECTRUM SHARING | 32-34 |
| 7 | PERPETUITY OF LICENCES | 35-37 |
| 8 | UNIFORM LICENSE FEE | 38-42 |
| 9 | SPECTRUM ASSIGNMENT | 43-45 |
| 10 | SPECTRUM PRICING | 46-47 |
| 11 | STRUCTURE FOR SPECTRUM MANAGEMENT | 48-51 |
| 12 | APPENDIX | 50-52 |



**ASSOCIATION OF UNIFIED TELECOM SERVICE
PROVIDERS OF INDIA**

Response to TRAI Consultation Paper No. 6/2009

on

**Overall spectrum management and review of
License terms and conditions**

Background

Spectrum, a vital input for wireless services, is a finite and scarce natural resource. In the past decade, the number and range of wireless applications has considerably increased, touching upon most areas of economic and social activities. Consequently, the demand for spectrum has increased multifold making it imperative to efficiently manage spectrum and ensure its optimal utilization. Spectrum has been the focus of constant attention in the context of a significant growth of the telecommunication sector in India over the last few years.

In August 2007, the Telecom Regulatory Authority of India had made certain recommendations pursuant to which issues relating to spectrum assignment etc were examined by the committees setup by Department of Telecommunications. In July, 2009, Department of Telecommunications had sought the recommendations of this Authority on various aspects concerning spectrum availability for telecom services and its management.

The main issues for deliberation include spectrum related issues viz. identification of spectrum bands for commercial usage, assessment of demand for spectrum and its availability, ensuring efficient utilization of available spectrum, policy for re-farming of spectrum, spectrum allocation mechanisms, spectrum pricing, spectrum trading & spectrum sharing. Licensing related issues include need for limiting the number of access service providers in a service area, De-linking spectrum from license, Terms and conditions of existing UAS/ CMTS license for extending validity of these licenses perpetually or otherwise. Spectrum consolidation methods include M&A, spectrum trading/ sharing, technological advances, etc.

Structure of the Report

- Responses are provided as per the questions raised by TRAI and bucketed in sections as prescribed by TRAI.
- It is to be noted that in June 2008, government constituted the Spectrum committee to examine the issues related to Spectrum assignment etc. The committee has submitted its recommendations in May 2009. We would like to emphasize that AUSPI doesn't support the recommendations made by the Spectrum committee as we believe that these are highly inclined in the favor of certain GSM operators. Hence, the observations are not a correct replica of the industry and cannot be viewed from a neutral point of view. The same has been earlier communicated to the government in several letters and discussions
- In line with the above viewpoint, Response nos. 46, 47 and 50 have not been addressed in this document

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?

We are not in agreement with the subscriber base projections as have been detailed in the consultation paper. Subscriber base projections in the TRAI consultation paper are based on CAGR of the previous years (Refer Table 3 of TRAI Consultation paper), which 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.

Given the difference in the current penetration levels across circles, there is an underlying expectancy that the growth rate in the penetration levels will differ by circle. 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. **The all India wireless subscriber base is expected to be 903 Million by December 2014** (Refer table below).

Table 1: Wireless Subscriber Projections (Million)

| Year | Dec-09 | Dec-10 | Dec-11 | Dec-12 | Dec-13 | Dec-14 |
|-----------------------------|--------|--------|--------|--------|--------|--------|
| Subscriber base (All India) | 503 | 582 | 670 | 751 | 827 | 903 |

Source: Internal analysis

Note1: Decreasing growth rate for various circles estimated based on existing teledensity levels

Note2: Based on population and teledensity, subscriber numbers estimated for each circle

The detailed penetration/ teledensity rates in different circles are presented in Appendix A to this note. This estimate is comparable to that made by TRAI in the consultation paper. Some of the projections made by reputed analysts are shown in the table below:

| Year | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|-----------------------------------|------|------|------|------|------|------|
| TRAI Consultation Paper (Oct' 09) | 557 | 730 | 888 | 999 | 1093 | |
| HSBC (24 Mar' 09) | 478 | 553 | 623 | 681 | 718 | 743 |
| Deutsche Bank (27 Feb'09) | 444 | 500 | 567 | 611 | 648 | 707 |
| UBS (24 Mar' 09) | 547 | 675 | 779 | 868 | 946 | 1015 |

Note: It may be noted that on a comparable basis, the subscriber projections of the current TRAI consultation paper is higher vis-à-vis the Revised Information Memorandum for Auction of 3G and BWA Spectrum released by DoT which is 700 million by 2012

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

We are not in agreement with the spectrum requirement projections as captured. 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 2 X 6.2 MHz for GSM and 2 X 5 MHz for CDMA, we have analyzed the scenario for a unit sq km. Please note the assumptions are being considered for a typical dense urban area

Key Assumptions

- Allocation of spectrum – 2 X 6.2 MHz (32 channels) per operator
- BCCH – 14 Channels , NBCCCH – 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/subscriber 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 TS FR | 28 | 28 | 28 | 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 | 19 |
| Maximum Erlang Per sector | 33.06 | 33.06 | 33.06 | 12.33 |
| Unevenness Percentage | 0.1 | 0.1 | 0.1 | 0.1 |
| Number of Timeslots available after unevenness | 30 | 35 | 33 | 17 |
| Erlangs Available - after unevenness | 23.43 | 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 2 X 6.2 MHz per operator = $1396 / 35$ mE ~ 40,000 subscribers**
- **Maximum subscribers to be support on 2 X 6.2 MHz for 10 operators = 4 Lac subscribers**

Comparing the subscribers supported to the population per sq. km with regard to 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 million / 1484 = 17,073 per sq. km
- **Dense area Population density – 17,073 * 10 = 1.7 Lacs people**

Accordingly, it can be concluded that 2 X 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)
- Configuration of the site to a higher configuration. For example 4/4/4/ could be configured to 6/6/6/
- With 2 X 6.2 MHz, one can realize good trunking efficiency gain than 2 X 4.4 MHz
- Frequency reservation on IBS is possible with 2 X 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 2 X 86.8 MHz for GSM (for 14 operators) and 2 X 20 MHz for CDMA (for 4 operators) considering migration to dual technology in the future. Considering an example for Delhi, the above calculation provides the total spectrum requirement for 2 X 106.8 MHz against the available spectrum of 2 X 68.6 MHz

Accordingly, it can be concluded that there is no requirement for additional spectrum to be allocated to operators in addition to 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.

Further, it is recommended that other technologies be assigned 2 X 5 MHz for 3G, 1 X 20 MHz for BWA and 2 X 10 MHz for LTE. However, the complete spectrum available in the band should be made available for these services.

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 re-farming in India as the present capacities available with the operators are insufficient to efficiently service the demands of the rapidly expanding subscriber base. Traditional methods like voluntary withdrawal or expiry of license have been more frequently used globally. However, they may not be suitable in the present environment as these are

time consuming approaches. Accordingly, some form of financial incentive may need to be provided to incumbents (both private and government operators) to vacate the spectrum on a priority basis.

In India, the re-farming of spectrum from Government agencies could be a time consuming process in spite of any financial incentives being offered, as there could be a resultant requirement of rehauling of operating systems and equipment etc which may not be feasible in the short term. **Consequently, there is a need to explore measures that can promote re-farming from incumbent private sector users who have been allocated spectrum in excess of the maximum requirement and as prescribed in the license agreement.**

Proposed mechanism for re-farming in India:

- *Re-farming 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 re-farming
 - 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
- *Re-farming from private operators:* Since re-farming 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 limit could be set at a maximum of 2 X 2.2 MHz in the 900 band for GSM operators to ensure equitable distribution of this band across all operators.
 - Such refarmed spectrum may be reallocated on a priority basis to operators yet to receive minimum contractual spectrum
 - 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.

Global experiences and methodologies:

The proposed re-farming approach above has been drawn post analysis of various global experiences and methodologies, which are detailed below:

- **Voluntary Re-farming:** Such re-farming is an outcome of a natural migration process, usually when older obsolete technologies are replaced with newer more advanced ones. In those cases re-farming is either in the interest of incumbent users of frequency bands or incumbent users leave that band with removal of their old systems. In both of these cases re-farming will usually not cause noticeable problems to spectrum management authorities and therefore the use of incentives or other re-farming measures will not be necessary in most cases.¹
- **Forced/ incentivised re-farming:** Such re-farming is primarily enforced when there is an urgent spectrum shortage, which makes it imperative to force/ incentivise re-farming from incumbent operators.

There are various methods of forced/ incentivised re-farming, which have been analyzed and summarized below:²

Table 2 Advantages and Disadvantages of different re-farming methods

| No. | Method | Advantages | Disadvantages |
|-----|---|--|---|
| 1. | Migration by expiry of current license and end of lifetime of equipment | No requirement for regulatory intervention | Problem as existing licenses are awarded for 20 years. |
| 2. | Forced migration to frequency bands within tuning range of equipment used | Enables existing equipment to remain in use, minimizes costs and disruption to existing user. This has been a feasible solution for military services due to the wide tuning ranges. | It may not be possible to migrate all the services to spare spectrum within the tuning range. Spectrum within the tuning range may not be the ideal long term choice as it may subsequently be required to support ongoing growth in demand for new services. |
| 3. | Forced migration into other frequency bands | May provide a more satisfactory long term solution than migration within tuning ranges | This can be technically and economically difficult to implement. In some cases there will be no suitable alternative spectrum and in others it will require new costly infrastructure. It may also require a longer transition period that does not fit with the need to allow early release of spectrum. |
| 4. | Forced use of more spectrally efficient equipment | This could release limited spectrum by using equipment that is more spectrally efficient in part of the available band. | Insufficient spectrum may be released. May lead to a temporary increase in the spectrum required by existing operators if a transition period is required (i.e. both technologies need to operate simultaneously) |

Different countries have adopted a mix of tools for re-farming. Summary of common methods adopted across countries is provided in the table below:

Table 3 Re-farming tools adopted in different countries

| No. | Country | License Expiry | License revoke | Re-tuning | Voluntary | Compensation (Re-farming fund) | Compensation (New User) |
|-----|---------------|----------------|----------------|-----------|-----------|--------------------------------|-------------------------|
| 1. | Bulgaria (BG) | | | | | | • |
| 2. | Canada | | | | • | | |

¹ Refarming and Secondary Trading in a Changing Radiocommunications World, Messolonghi, September 2002, ECC-CEPT

² Telecom Regulatory Authority of India Consultation Paper on Spectrum related issues: Efficient Utilisation, Spectrum Allocation, and Spectrum Pricing; May 2004

| No. | Country | License Expiry | License revoke | Re-tuning | Voluntary | Compensation (Re-farming fund) | Compensation (New User) |
|-----|----------------------|----------------|----------------|-----------|-----------|--------------------------------|-------------------------|
| 3. | Czech Republic (CZ) | | | • | | | |
| 4. | Denmark (DK) | • | | • | • | | |
| 5. | Estonia (EST) | | • | | | | |
| 6. | Finland (FI) | • | • | | • | | • |
| 7. | France (F) | | | | | • | • |
| 8. | Germany (D) | | • | | • | | |
| 9. | Hungary (H) | • | • | • | | • | |
| 10. | Ireland (IRL) | | | | • | | |
| 11. | Italy (I) | | | • | | | • |
| 12. | Latvia (LV) | | • | | | | |
| 13. | The Netherlands (NL) | | • | | • | | |
| 14. | Poland (PL) | | | | • | | |
| 15. | Portugal (P) | • | • | | • | | |
| 16. | Sweden (S) | | • | | • | | |
| 17. | Switzerland (CH) | • | | | | | |
| 18. | United Kingdom | | | | • | | |
| 19. | USA | | | | | • | |

Source: *Re-farming and Secondary Trading in a Changing Radiocommunications World*, Messolonghi, September 2002, ECC-CEPT, Internal Research

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 bands; Spectrum limits for the 900 MHz band can be defined at 2 X 2.2 MHz per operator
- Independent committee to be established to assess spectrum re-farming potential from government agencies
- Government agencies to be compensated for re-farming from license feeds, 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 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, 2 X 2.2 MHz of spectrum in the 900 MHz band could be the maximum for any GSM operator in a LSA
- 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 on 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

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 reformed 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 be defined for India:

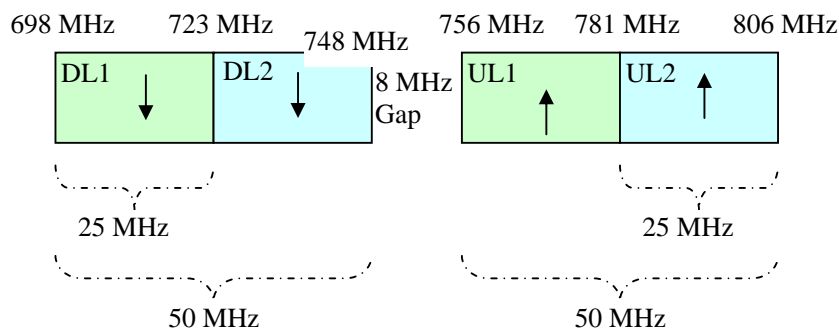


Figure: The band structure with dual duplexers having the same duplex distance which could be of same or different sizes

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.

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 study³, 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.

Government should provide clear timelines for 700 MHz band availability at the earliest possible and before the 3G auction. 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

³ Exploiting the digital dividend, Analysis Mason, DotEcon and Hogan & Hartson, September 2009

Licensing Issues

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

It is recommended that the spectrum be delinked from the UAS licenses to be granted in the future.

Global trend is also to delink spectrum from UAS license and the same should be adopted in India going forward. In most countries spectrum management is delegated to a different administrative group from the group that regulates other aspects of telecom 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 spectrum.⁴

Further, spectrum is a scarce resource and insufficient to meet even the contractual requirements of the existing players. Continued linking of the spectrum with future licenses could also restrict the issuance of additional licenses, which could be considered restrictive.

However, in India as spectrum has already been contracted to all existing UAS licensees and 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 declared that their break-even periods have become as high as 25 years in light of the recent reduction in tariffs which have made the 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 recent entrants have entered the industry based on business plans that are based on the awarding of spectrum along with the License. Any modification to the same, within the 20 year period, would adversely impact the business plan

In conclusion, it is recommended that spectrum should be delinked from the UAS licenses to be granted in the future as there is insufficient spectrum to meet the requirements of the licensed allottee.

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 should depend on the total available spectrum, subject to each operator having the option of acquiring the contracted spectrum of 2 X 6.2 MHz for GSM and 2 X 5 MHz for CDMA. As highlighted in response to Q. 7 above, this quantum of spectrum is optimal for efficient network and subscriber base management. The minimum number of operators in a service area could be kept at 5, including 1 PSU operator.

Maximum number of access service providers in a service area:

⁴ Telecommunications Regulation Handbook, infoDev, 2000 The World Bank

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.

However, in **case the spectrum continues to be linked to subsequent licenses, the scarcity of spectrum would play a pivotal role in deciding the maximum number of players.** Since the government would be required to allot minimum contractual committed spectrum and the supply of spectrum is limited, the possible mechanism to ensure that all eligible licensees obtain the spectrum is by limiting the number of service providers

To determine this limit on the number of operators in a service area based on the availability of spectrum, we would need to consider the optimal spectrum required to be allocated along with the license to any operator, which is 2 X 6.2 MHz for GSM and 2 X 5 MHz for CDMA. Accordingly, the maximum number of operators in a circle should ideally be the total spectrum available in that circle divided by 2 X 6.2 MHz. For example, Delhi circle has total allocated spectrum of 53.6 MHz for GSM operators.⁵ This implies that there should be approximately eight GSM operators in the circle. The government has already awarded licenses to 12 players in GSM resulting in a need to refarm some additional spectrum towards fulfilling the licensed operators. The number of operators in a circle in India is significantly higher than that in other countries (refer Table 4). However, considering the growth potential of the telecom sector in India and the high investment requirements, there is a case for allowing more operators as compared to international markets.

Minimum number of access service providers in a service area:

Objective of setting a minimum limit on number of operators is to ensure competitiveness of the market. As has been suggested earlier by TRAI⁶ the minimum number of operators in a circle should be four to five. **This minimum number of service providers is considered adequate to prevent any cartelization and market share monopolization.** HHI in India ranges from 0.16 to 0.23, excepting J&K which has an HHI of 0.30. This number is in conformity with the HHI of other markets. As per international trends this level of HHI is achieved when operators **are five or more** according to the table below.

Table 4 HHI and market structure - International Comparison

| Country | Cellular operators | HHI | Country | Cellular operators | HHI |
|-------------|--------------------|------|---------|--------------------|------|
| New Zealand | 2 | 5011 | Canada | 4 | 2899 |

⁵ TRAI Consultation Paper on Overall Spectrum Management and Review of License Terms and Conditions, October 2009

⁶ TRAI: Recommendations on Review of license terms and conditions and capping of number of access providers, August 2007

| | | | | | |
|----------------|---|------|-------------|---|------|
| Slovakia | 2 | 5077 | Greece | 4 | 3736 |
| Luxembourg | 2 | 5323 | Germany | 4 | 3747 |
| Poland | 3 | 3343 | Australia | 4 | 3240 |
| Singapore | 3 | 3760 | Italy | 4 | 3335 |
| Czech Republic | 3 | 3793 | Finland | 4 | 3490 |
| Hungary | 3 | 3811 | Sweden | 4 | 3760 |
| France | 3 | 3880 | Switzerland | 4 | 4496 |
| Spain | 3 | 3887 | Turkey | 4 | 5065 |
| Portugal | 3 | 3954 | Mexico | 4 | 6245 |
| Belgium | 3 | 3976 | UK | 5 | 2282 |
| South Korea | 3 | 4070 | Netherlands | 5 | 2604 |
| Korea | 3 | 4134 | Austria | 5 | 3188 |
| Japan | 3 | 4490 | Norway | 5 | 4348 |
| Ireland | 3 | 4650 | Hong Kong | 6 | 1930 |
| Iceland | 3 | 5545 | Brazil | 7 | 2273 |

Source: Market share data from OECD 2005, analysis by TRAI

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

The considerations for spectrum allocation should include ensuring optimal utilization of a scarce national resource coupled with enhancing coverage, subscriber base and affordability for end consumers. Further, the considerations should be formulated with a view to prevent hoarding, making adequate spectrum available to licensed operators, facilitating a conducive competitive atmosphere and ensuring a technology neutral level playing field.

Spectrum being a scarce resource is likely to be a target for accumulation. Any hoarding of spectrum has the potential to offer significant competitive advantage and supernormal benefits to the holder through reduced capital investment requirements. Further, any shortage of spectrum for all operators due to accumulation by few operators could drive up the overall prices of spectrum resulting in the other operators incurring an additional capital expense to increase capacity of their network. This could directly compromise consumer interest' through increase in tariffs or slower network rollout.

Accordingly, it is imperative that initial spectrum per entity be capped at the quantum specified in the UAS license. Further spectrum allocations, beyond meeting the contractual commitments, could be based on a market driven approach, which will ensure assignment to the operator with the maximum requirement.

Globally, there is evidence to suggest that spectrum caps have been used as a tool to regulate the market and promote competition. However, these caps are mostly temporary, for a defined period of time, to maintain competitiveness in the market, prevent any operator from acquiring excess spectrum or till such time that the market attains maturity. Some examples are as below:

Table 5 Spectrum caps in different countries

| No. | Country | Type of cap | Description |
|-----|----------------|-----------------------------------|--|
| 1. | United Kingdom | Temporary caps for 3G auction | Need to incentivise incumbent players to release their spectrum <ul style="list-style-type: none"> ▪ Cap of 17.5 MHz for holders of sub 1 GHz spectrum and ▪ Overall 2G spectrum cap of 25 MHz Bidders have to relinquish spectrum to gain spectrum in 3G band |
| 2. | USA | Removed caps since market matured | FCC will analyze competitive effects of transactions involving mobile telephony service providers on a case-by-case basis. |

| No. | Country | Type of cap | Description |
|-----|-------------|----------------------------|---|
| 3. | New Zealand | Extended caps by 3.5 years | Initially imposed temporary caps of 15 MHz for 3G licenses on award |

In conclusion, 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

There should be a spectrum cap of 2 X 5 MHz for CDMA and 2 X 6.2 MHz for GSM; out of which 2 X 2.2 MHz should be capped in the 900 MHz band.

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, 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.

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 the operator who values the spectrum the most shall pay an appropriate price to obtain it. **Therefore, there is no requirement of a maximum spectrum limit per individual entity, unless it leads to market monopolization/ cartelization. Detailed considerations to determine these limits are discussed in the M&A, Spectrum trading and sharing sections.**

Key conclusions:

- **First priority should be to ensure that all operators received the spectrum as per contractual obligations. As the available spectrum is scarce, this may warrant spectrum re-farming from operators who are holding spectrum in excess of these limits**
- **As any additional spectrum is allotted through a market driven process where all operators have equal right to claim for the additional spectrum, there may not be a requirement for a cap. However, the overall spectrum holding limits that are applied during M&A, Trading and sharing should be taken into account. These have been discussed in detail in the relevant subsequent sections**
- **For 3G and BWA, since the allocation is in blocks of 2 X 5 MHz and 1 X 20 MHz respectively, and some circles have a maximum of 2 blocks, a single block should be considered as the maximum spectrum per entity in such LSAs, to prevent monopolization of the market**

For one licensee there should be a 2G spectrum cap of 2 X 5 MHz for CDMA and 2 X 6.2 MHz for GSM; out of which 2 X 2.2 MHz should be the maximum in the 900 MHz band.

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 spectrum limit is recommended to be specified in line with the contractual commitments (2 X 6.2 MHz for GSM and 2 X 5 MHz for CDMA)

Any additional spectrum available with operators, above the limit should be taken back. Further, the availability of additional spectrum would have provided a competitive edge to the operator in terms of capital cost, faster roll-out and capability to offer lower tariffs. Since the additional spectrum was allocated without payment of any market linked fee, the operator should be charged for the use of the additional spectrum on a retrospective basis – i.e. from the time of the initial assignment of the additional spectrum.

In the future it is recommended that priority be given to allocation of spectrum to fulfill the contractual obligations. All subsequent spectrum allocations are recommended to be auctioned and subject to applicable usage charges.

Re-farming of excess spectrum from incumbent operators, may adversely impact the quality of service provision to the subscriber base in the short term. Therefore, before re-farming back, a sufficient time line should be granted to the operator to arrange for the requisite spectrum through sharing/ trading with other operators, or implement spectrum efficient technologies. During this time period, higher spectrum usage charges should be levied with a steep escalation and time bound escalation clause.

For one licensee, there should be a 2G spectrum cap of 2 X 5 MHz for CDMA and 2 X 6.2 MHz for GSM; out of which 2 X 2.2 MHz should be the maximum in the 900 MHz band.

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

Given the continuous innovations in the business models and service offerings within the sector, it would be restrictive/ protective for new players to be barred from entry into the market. Allowing new entrants would further the competitive intensity to the end benefit of the consumer through the introduction of innovative business models and bring additional offerings to the customers.

However, given that spectrum is a scarce resource and there already exist a large number of licensees with unfulfilled spectrum commitments, it is imperative that any subsequent licenses should be granted only after de-linking the spectrum from these licensees.

To ensure that new operators keep their services affordable and maximize coverage and subscriber base, it is recommended that only a nominal license fee be charged. However, the cost should be sufficient to deter fly-by-night operators from entering the industry and to avoid further fragmentation of the industry.

TRAI had recommended that fresh license fees could range between INR 5 to 1 crores per LSA depending on the category. However, the same can be revised upwards keeping in mind the aforementioned considerations and the time cost since the period when the TRAI recommendations were suggested. It is recommended that the fees be capped at INR 10 Crores for Metros and Category A LSA, INR 5 Crores for Category B LSA circle and INR 2 Crores for Category C LSAs.

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 with the dual objectives of recovery of administrative costs and to deter fly-by-night operators from gaining licenses for individual profiteering.

TRAI had recommended that fresh license fees could range between INR 5 to 1 crores per LSA depending on the category. However, as discussed in the earlier response, the same can be revised upwards. It is recommended that the fees be capped at INR 10 Crores for Metros and Category A LSA, INR 5 Crores for Category B LSA circle and INR 2 Crores for Category C LSAs.

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.

Currently, spectrum assignment is unequal and suboptimal across operators. However, it is recommended that excess spectrum being held by select incumbents be refarmed and reassigned amongst all operators, with a focus on leveling the playing field and ensuring fulfillment of contracted spectrum allocations. In such a scenario, no player is expected to have spectrum above the set limits (2 X 6.2 MHz for GSM and 2 X 5 MHz for CDMA). This quantum of spectrum is considered optimal for efficient network roll-out and subscriber base coverage and servicing. Given the limited spectrum holding by each individual licensee, there is no perceived need for a detailed spectrum audit at the present time.

In the future, it is recommended that excess spectrum assignment (beyond the contracted obligations) be done through an auctioning process. At such time, there could be a case for undertaking an audit a requesting for an independent spectral efficiency assessment from the operator. However, given the high costs in procuring this additional spectrum through auctioning, it is perceived that the operators would bid judiciously as only those who assign maximum value for the additional spectrum, and thereby needing it the most would be able to obtain it. As such, it is expected that it would be in the operators own self interest to ensure minimization of costs through optimal utilization of the spectrum and adoption of spectral efficiency improvement measures. Accordingly, a detailed spectrum audit may not be required even in this instance..

Furthermore, the operational design and implementation of a spectral audit would be a cumbersome and complex process. There are also no available Global standards to define spectral efficiency and it varies by parameters like type of equipments used, spectral efficiency measures deployed, technology type, nature of coverage offered, etc. This could also be one key reason why no other country in the world has been able to implement any spectral audit mechanism.

Overall, it is recommended that no spectrum audit be mandated at the present time.

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 can be extremely challenging. Key challenges would include:

- Agreeing on a common definition of a rural, semi-rural and urban consumer
- Undertaking geographic segmentation of rural and urban and determining the total number of service areas to be made post division, especially given that every service area could have an interspersed rural and urban consumer base
- Administrative challenges in managing a large number of services areas
- Ensuring no arbitrage opportunities in case of applying separate usage charges for rural and urban 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 would also entail significant additional investment to be made to upgrade the operator's IT systems and billing processes, which could be passed back to the consumers, negating any positive impact from such an exercise

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 is that cellular services are inherently mobile in nature; therefore assigning them based on geographic boundary of rural/ urban may not be feasible. Asymmetric pricing could potentially also result in arbitrage opportunities for the operator and the consumers thereby diluting the objective.

Considerations to be taken into account while assessing the affordability in rural areas:

- India has the lowest call rates in the world and these have been further reduced in the recent past to as low as 0.5 paise per second⁷. While the call charges are the lowest, India's per capita income is comparable, if not higher than several other countries.
- Incumbent operators have already invested in developing the rural infrastructure and made huge inroads in rural coverage. With increased competition in urban areas, the focus of operators has moved to rural areas where acquiring new subscribers is easier given the lower competition levels.
- Further, while urban areas have higher investment requirements, they also provide better returns due to the volume of traffic generated and the economies of scale. Similarly, rural areas may require lower investment, however, the reduced traffic volumes and subscriber levels could result in increasing the capital cost per subscriber. Therefore, capital expense per subscriber is not expected to be significantly different between rural and urban consumers.

⁷ As per the latest plan introduced by MTS in Delhi circle



In conclusion, the affordability of the service does not seem to be a concern in rural areas. Therefore, asymmetric pricing even if feasible, is not an implementable solution to achieve the objective of enhancing rural penetration and therefore is not recommended.

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 |

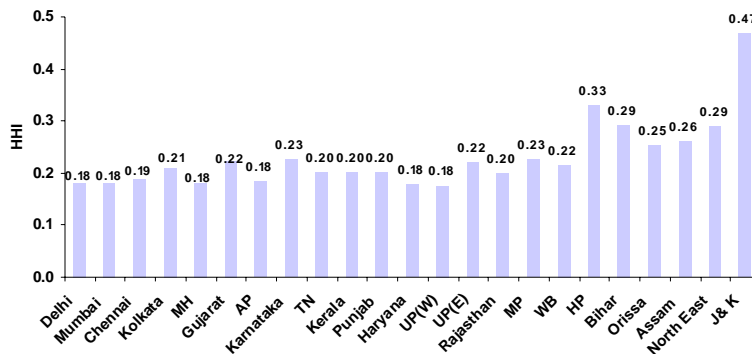
Market share (both AGR and subscriber base) not more than 40%

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

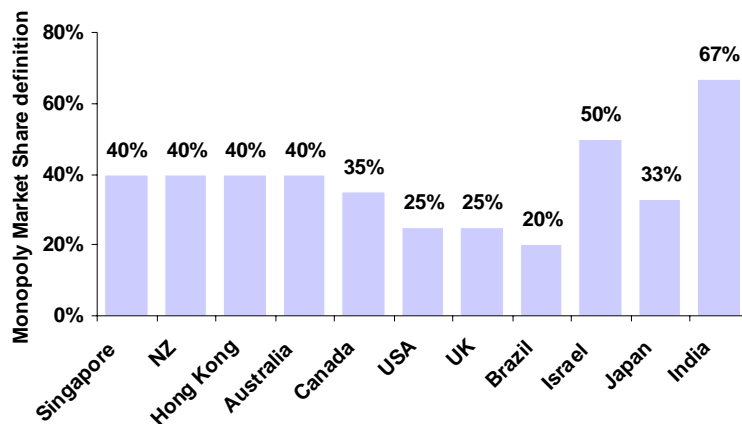
| Circle | Player 1 | Player 2 | Player 3 | Player 4 | Total Subscriber Base | Market share on merger of Player 1 and 2 |
|-------------|----------|----------|----------|----------|-----------------------|--|
| Delhi | 3.28 | 2.6 | 2.36 | 1.73 | 12.75 | 46% |
| Mumbai | 2.67 | 1.99 | 1.95 | 1.49 | 10.57 | 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.

Figure 2: Definition of Monopoly market player share in various countries



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

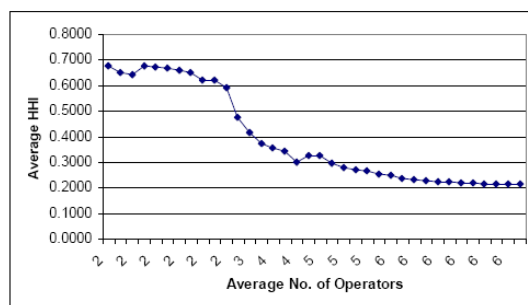
The total number of operators not to go below 4

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



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 2 X 12.4 MHz in the case of GSM operators and 2 X 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.

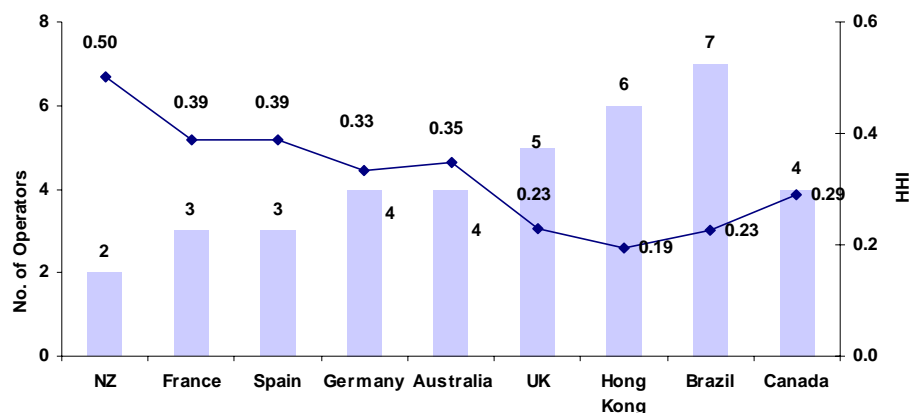
Globally most of the M&A activities are regulated by the Competition Commission of the respective countries and only have spectrum caps, but don't have a cap on the market share of the merged entity as elucidated below –

| Country | Competition Policy |
|-----------|--|
| Australia | Spectrum is treated like an asset. The Australian Competition Authority deals with any competition issues regarding the acquisition of spectrum. |

| Country | Competition Policy |
|-------------|--|
| 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 4: 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 and 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 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?

There should be no transfer charge on spectrum upon Merger & Acquisition on the back of strict roll out obligations and restrictions on market share, AGR and maximum spectrum that can be held by the merged entity. The regulation should be the same in case of M&A and trading and sharing of the spectrum.

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 and 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, re-farming 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

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 5 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.

it is recommended that the maximum limit on the spectrum holding for merged entity be capped at 2 X 10 MHz for CDMA and 2 X 12.4 MHz for GSM, subject to a cap of 2 X 4.4 MHz for 900 MHz band

Spectrum Trading

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

M&A and Spectrum sharing should be the preferred options for enabling efficient spectrum utilization in the long run. However, in the instance that spectrum Trading becomes inevitable, the same should be undertaken with the objective of ensuring efficient spectrum utilization while at the same time discouraging spectrum hoarding and market monopolization.

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 re-farming, re-auctioning, M&As etc, as it market driven and accordingly, more responsive to changes in technology and consumer demand. Allowing Spectrum trading provides the licensees an option to align their spectrum holdings with their 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.

Globally, there are numerous examples of using spectrum trading being adopted by numerous countries as a preferred mechanism for spectrum consolidation, including US, UK and Australia. Ofcom introduced spectrum trading in the UK at the end of 2004 as a key element in its programme of market-based reform. Since then trading has been progressively extended to a broader range of licenses.

Table 7: Global Instances of Spectrum Trading and associated Rights and Policies

| Country | Implementation | Nature of Rights | Competition Policy |
|-------------|---|---|--|
| Australia | Auction held in 1997 in the 500 MHz band. Spectrum licences sold by auction then fully tradable. | Spectrum access rights defined in terms of geography and frequency. Rights are in the form of standard trading units | Spectrum is treated like an asset. The Australian Competition Authority deals with any competition issues regarding the acquisition of spectrum. |
| New Zealand | Introduced in 1989, applied first in broadcasting where the perceived need for reform was greatest. | A management right over any defined frequency band, nationwide, and for a specified period (but limited to a maximum term of 20 years by the Act) | General Competition law applies to spectrum trading. The Commerce Act is currently under Amendment |
| USA | Since 1996, FCC has been introducing measures to encourage secondary markets. These measures have promoted the partitioning/ disaggregation of licences and the leasing and resale of spectrum. | Licenses can be transferred, but must be notified to the FCC for approval. | Spectrum caps and competition law, although caps are being phased out. |
| Canada | Auction for PCS in 2GHz Frequency Range allows licences to be transferred and divisible in a secondary market. | All conditions that apply to a license will continue, as applicable. Licences will be divisible in the geographic dimension, only in terms of spectrum grid cells. There is no minimum limit to divisibility in the | Any license transfer may be subject to the Competition Act. |

| Country | Implementation | Nature of Rights | Competition Policy |
|---------|----------------|----------------------|--------------------|
| | | band width dimension | |

Source: *Re-farming and Secondary Trading in a Changing Radiocommunications World, Messolonghi, September 2002, ECC-CEPT*

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.

Accordingly, in India also the Spectrum Trading must be allowed with immediate effect, provided a robust and efficient operating model can be devised and implemented in line with proper procedures

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

Only UAS licensees who have been allocated some initial spectrum should be allowed to trade in spectrum.

It is imperative to ensure that all the players participating in spectrum trading are doing so with the objective of spectrum consolidation and not as alternative route for the entry 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 caps need 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 alternate spectrum to ensure adherence to the spectrum cap. 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 eligible licensees, 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, which have been unable to fulfill their 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?

No spectrum transfer charge should be levied since already there are myriad charges 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 is leased to the operator for a specific duration. Any operator trading spectrum 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 it is 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.

It is recommended that there should be no levy of transfer charges on trading of spectrum, in line with global policy standards

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, as already captured above.

However, if it is determined that transfer charge needs to be levied, the parameters and methodology for determining should be determined by balancing conflicting stakeholder interests and the following parameters:

- Government: The primary interest of allowing spectrum trading should be to ensure optimal utilization of the scarce spectrum resource, while also ensuring efficient market operations and adoption of fair practices. Further, there is an underlying intent to maximize coverage and outreach of various services to the end consumers, in a most affordable fashion. Finally, the license/ usage fee and auctioning of spectrum provides a source of revenues for the government and there is a need to ensure that spectrum trading does not result in a financial loss to the government.
- Consumers: the spectrum transfer charges should be determined such that the quality of service to the customers doesn't get affected and the customer payout in tariffs also doesn't go up.
- Operators: its important for the spectrum transfer charges to be adequate to deter spectrum hoarding but should also be low enough to ensure efficient spectrum consolidation
- Further, from a market efficiency perspective, there is a need to consider and differentiate on the basis of the following parameters, while keeping in mind that the administrative costs of implementing the same are not too high:
 - Frequency of the band: For example, 900 MHz frequency band is considered more useful as compared to 1800 MHz band for offering multiple services, the transfer charges applicable on the 900 MHz band must be higher than the transfer charges applicable on the 1800 MHz band
 - Amount of spectrum being traded

- Profile of the player trading spectrum: For example, an allottee who have completed 3 years lock-in and complied with their roll-out obligations should be charged a lower fees than an allottee who hasn't fulfilled either/ both of these criteria
- State/ LSA: Fees could be higher for LSAs where the underlying profit from the LSA is expected to be more – based on the profile of the underlying subscriber base.
- Number of players, Market share and HHI held by the players in the LSA

Global benchmarking of value of auctioned spectrum (USD Billion per MHz) in each of the frequency bands (800 MHz, 900 MHz, 1800 MHz, 2100 MHz) for 4-5 key countries including US, UK, Malaysia, Australia and Canada., can also be used as an indicator of the probable market value of this spectrum across countries and across players

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 should not be 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 globally, 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 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

Globally, there are several instances of introduction of spectrum caps for various bands of spectrum in the initial years, (not purely for 2G spectrum only), but these can be taken as indicative of band wise spectrum allocation –

Table 8: 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 |
| Canada | As in the U.S. spectrum caps introduced in the mid-1990s in Canada have been progressively relaxed and then removed. |
| 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 |
| 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 2.6 GHz 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). |
| 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 |

| Country | Spectrum Caps |
|---------|--|
| | 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

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 recommended that the minimum tradable block of spectrum must be kept at 2 X 1MHz for GSM and 2 X 1.25 MHz band for CDMA, since it provides for efficient utilization and has been established that technically it is sufficient to support a substantial number of additional subscribers.

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

Ideally, the cost of spectrum trading should be higher than the spectrum assignment cost.

Spectrum being a limited national resource is akin to land. 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. Similarly, the market value of spectrum, similar to 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.

The 3G Auction reserve price could be used as the basis of determining 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 should be allowed in India, as it promotes efficient usage of the scarce spectrum resource. However, it is imperative that a sound regulatory and operating framework be defined for operationalizing the same.

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 re-farming is implemented in India. Once spectrum re-farming 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.

- 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

The regulatory framework for spectrum sharing should to be developed with the objective of addressing the following key aspects:

- Pre conditions for spectrum sharing: Only operators with existing licenses and associated spectrum should be allowed to participate in the sharing of spectrum, after fulfillment of roll out obligations and completion of an initial 3 year lock-in period
- Detailed operating model for spectrum sharing should be determined by the market forces, on the basis of mutual consent and be free of any restricting regulations. The operating model would cover the minimum or maximum quantum of spectrum that can be shared, the tenure for sharing, the process of renewal/ exit from existing spectrum sharing agreements, the frequency at which sharing can be undertaken and the associated price.
- However, the regulatory framework should ensure curtailment of anti monopolistic conditions through spectrum caps and market share restrictions which can be capped at 35% of market share of the pooled entity/ receiving entity in the case of pooling/ leasing respectively. The caps will be based on subscriber base and AGR criteria, which is in line with the conditionality specified for M&A and Trading.

In conclusion, spectrum sharing should be allowed in India, as it promotes efficient usage of the scarce spectrum resource.

33. What should be criteria to permit spectrum sharing?

All the key criteria permitting the Spectrum M&A must also hold for Spectrum Sharing. These criteria should include –

- Only operators with existing licenses and associated spectrum should be allowed to participate in the sharing of spectrum
- Spectrum sharing should be allowed only after completion of an initial 3 year lock-in period or fulfillment of roll out obligations, whichever is earlier. Both the operators sharing spectrum must fulfill both these roll out obligations. However, an exception can be made in case one of the operators has not yet been assigned the spectrum, then the roll out obligations will not apply for that operator.
- Market share (both AGR and subscriber base) should not be more than 35% for the pooled entity in case of spectrum pooling and for the receiving entity in case of spectrum leasing
- Total number of active operators in the respective license area not to go below 5
- Quantum of spectrum to be shared and percentage share of licensees' total assigned spectrum

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?

It is recommended that spectrum sharing charges should be market driven, which will ensure that spectrum is put to the most efficient use. 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.

If however, the charges are to be regulated, the same should be prescribed per MHz for the actual amount of spectrum shared, rather than on the total allocated spectrum to the entity in LSA.

The underlying objective of regulating sharing charges should be to promote efficient utilization of spectrum in LSA, lowering the consumer charges, enhancing network coverage and prevention of spectrum hoarding and market monopolization.

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

In India, it is recommended that UAS licensees who have fulfilled their rollout obligations only be permitted to participate in spectrum sharing. This would ensure a level playing field across all the players and curtail profiteering through spectrum sale/ sharing. The operators who have not been allocated any spectrum would not need to fulfill the rollout obligations and as such, are eligible for participating in spectrum sharing on an exception basis.

Other preconditions, as applicable for M&A and spectrum trading would also apply in the case of Spectrum Sharing.

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 and three year lock-in are suggested to be mandatory for the all the licensee sharing the spectrum.

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

All the licensees 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 and accordingly, licensees who have not been allocated any spectrum in a LSA would not be required to fulfill these roll-out obligations.

Perpetuity of Licenses

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

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.

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 like MTS has extended to more than 25 years due to competitive tariff regimes like 0.5 p/ second billing etc, thus the license validity period of 20 years are insufficient for the operator to even achieve break even.

Table below outlines how the spectrum allocated in different cases should be treated and rationale therein.

Table 9 Suggestion on spectrum validity depends on assignment method

| S. No | Assignment basis | Payment made | Validity period | Treatment | Rationale |
|-------|-------------------------|------------------------|--------------------|--|---|
| 1. | Startup spectrum | License fee | 20 years | Spectrum retained with operator | Spectrum linked to license and license fee was for 20 years duration. |
| 2. | Awarded based on SLC | No payment made | Nil | Spectrum should be taken back and <ul style="list-style-type: none"> ▪ Reallocated to operators yet to receive minimum contractual spectrum ▪ Auction surplus spectrum ▪ Operator can also share/ trade spectrum for its requirements | <ul style="list-style-type: none"> ▪ Essential for government to fulfill contractual obligations ▪ Essential to introduce market mechanism to promote efficient utilization of spectrum |
| 3. | Allocated for alternate | Fees paid equal to the | Up to the original | Spectrum retained with operator. Fees paid should | Spectrum linked to license and license fee |

| S. No | Assignment basis | Payment made | Validity period | Treatment | Rationale |
|-------|-----------------------|--|--------------------------------------|--|---|
| | technology | entry fee applicable to the new UAS licenses | period i.e. co-terminus with license | be proportionate to duration for which the spectrum assigned. Balance may be adjusted against future license fee/ paid back. | was for 20 years duration. |
| 4. | Subsequent allocation | Spectrum to be won through auction | 20 years | Operator free to share/ trade. | Essential to introduce market mechanism to promote fair price and utilization of spectrum |

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. The rationale for defining time period for spectrum rights is captured in the ICT Regulation Toolkit. The relevant extract is reproduced below:

“An argument in favour of granting spectrum usage rights in perpetuity is that users make complementary investments in stages and each investment has a different payback period.

Indeed, one goal of spectrum regulation should be to encourage investment and innovation. Economists who place their trust in unfettered market forces therefore advocate that spectrum usage rights be granted in perpetuity. This implies that, after the primary assignment of spectrum, the regulator would only have to intervene if users wished to return spectrum, or if their right of use were withdrawn owing to a breach of the conditions of use.

Nevertheless, since there are significant imperfections in the market, it may make sense to give the national regulatory authority the option of withdrawing spectrum usage rights. Alternatively, a certain period of time could be specified at the end of which the regulator decides whether or not the spectrum usage right shall be extended.”

Internationally Germany, United Kingdom, Peru, New Zealand⁸ have all issued 20 year spectrum usage licenses.

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

⁸ Telecommunications Regulation Handbook, infoDev, 2000 The World Bank,

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 10th 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?

We recommend that the license should be made perpetual along with the spectrum for the existing licensees. However, if the spectrum assignment is done for a defined period, then the extension should be granted for a minimum duration of 20 years.

Any subsequent extension of the spectrum should not attract any charges from the existing licensees.

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?

We recommend that the license should be made perpetual along with the spectrum for the existing licensees. However, if the spectrum assignment is done for a defined period, then 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 renewal/ extension of the tenure of spectrum allocation, subject to fulfillment of the prescribed terms & conditions of the license.

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.

The main advantages and disadvantages are summarized in the table below:

Table 10 Advantages and disadvantages of a uniform license fee

| Advantages |
|---|
| • Operator free to chose technology. Hence, efficiency increases and it promotes adoption of latest technology. |
| • Encourages substitutability (For example mobile and landline can be interchanged) as same operator provides both services. This promotes competition and reduces tariffs. |
| • No burden on regulator to keep tab on technological development and regulate services. |
| • Reduction in litigation as all operators free to offer any service so other operators are not disadvantaged. |
| Disadvantages |
| • Operators who are focusing on a particular service/geography with low profitability may be paying higher license fee. For example operators focusing on rural telephony |
| • In case spectrum is linked to license then it does not promote spectrum efficiency |
| • Government may obtain lower license fees if rate is set below maximum rate |

International trend: Other mature markets have also done away with separate licenses for separate services. In fact, in some of the countries, there is no requirement of a license altogether, and an operator only has to inform the regulator of his services subject to his fulfilling certain minimum predefined obligations. Some examples of license regimes in other countries are outlined below:

Table 11 Uniform license regimes in select countries

| Country | Description | Spectrum allocation |
|----------------|---|---------------------|
| Australia | 'No licensing regime' | Done separately |
| Denmark | 'No licensing regime' | Done separately |
| United Kingdom | 'No licensing regime' | Done separately |
| Europe | Service specific licenses will be replaced by authorizations in the EU Countries as per directive by European Parliament and the Council | Done separately |
| Singapore | Licensees categorized into Facilities based Operators (FBOs) and Service Based Operators (SBOs). | |
| Malaysia | Four categories of licenses viz. Network Facilities Providers, Network Service Providers, Application Service Providers and Content Application Service Providers, for all telecom services | |

Source: TRAI Recommendations on Unified Licensing, August 2004

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 31st August 2009⁹ 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.

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.

Quote

⁹ AUSPI/13/2009/114

4.4 Fiscal Issues

The Department of Telecommunications assigns a very high priority to indigenous manufacture of Broadband related equipments. It shall endeavour to work closely with the concerned Ministries and Manufacturers' Associations so that the equipments are available at an affordable price. The department is conscious of the fact that Broadband services can reach the urban and rural consumers only if services are offered at affordable and easy terms. Department of Telecommunications will work out a package in consultation with Ministry of Finance and related Departments as well as concerned service providers to achieve this.

Unquote

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.

In conclusion, there should be a uniform license fee for all telecom licenses and service areas except internet services and IP-1 service providers.

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 (refer table below). The corpus is expected to bloat further with increasing revenues.

Table 12 Universal Service Obligation Fund position as on 31.01.2009

| Financial Year | Opening Balance | Funds collected as USL | Funds allocated and disbursed | Balance at the end of Year |
|----------------|-----------------|------------------------|-------------------------------|----------------------------|
| 2002-03 | 0.00 | 1653.61 | 300.00 | 1353.61 |
| 2003-04 | 1353.61 | 2143.22 | 200.00 | 3296.83 |
| 2004-05 | 3296.83 | 3457.73 | 1314.59 | 5439.97 |
| 2005-06 | 5439.97 | 3533.29 | 1766.85 | 7206.41 |
| 2006-07 | 7206.41 | 4211.13 | 1500.00 | 9917.54 |
| 2007-08 | 9917.54 | 5405.46 | 1290.00 | 14033.00* |
| 2008-09 | 14033.00* | - | 655.88 | |
| Total | | 20404.44 | 7027.32 | |

**Ministry of Finance has stated that the reimbursement of license fees and spectrum charges to BSNL amounting to INR 6948 Crores during the period 200203 to 200506 for fulfilling rural obligation is required to be taken into account for arriving at the available balance. Taking into account the compensation made to BSNL, the available balance would be INR 7085 Crores only (140336948) at the beginning of F.Y. 2008-09.*

Ref: http://www.dot.gov.in/uso/2009/Table_VII_31.01.2009.xls

- **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. **Therefore the proposal of uniform license fee of 9% is likely to undermine competition and may affect adversely the consumer interests.**
- 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) Reduction in the USO levy from 5% to 2%.**
- (iii) Uniform License fee is welcome but it should not include pure internet services and IP-I service providers.**
- (iv) 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:

Meeting the existing 2G spectrum requirement as per the committed spectrum in the UAS license

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

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

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?

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. 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

- Re-farm additional spectrum held by operators beyond the committed spectrum as per license i.e. 2 X 5 for CDMA and 2 X 6.2 MHz for GSM, with a cap of 2 X 2.2 MHz in the 900 MHz band.
- Surplus spectrum post fulfillment of all contractual commitments, if any, should be auctioned
- 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?

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 re-farming 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 onetime 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.

As such, **it is recommended that such excessive spectrum (beyond the contracted commitments) should be refarmed and reallocated amongst licensees' holding lower than commitment spectrum**

Further, since the excess spectrum has afforded significant competitive advantage to these incumbents in terms of savings in capital expenses, **it is proposed that a one time charge for the additional spectrum be imposed retrospectively on the service providers having spectrum above the committed threshold.**

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 2 X 6.2 MHz of spectrum for INR 1650 Crores, the upfront charges could be computed as follows:

- Calculate Per MHz spectrum charge for additional entry fee for spectrum beyond license mandated 2 X 6.2 MHz for GSM
- Divide the entry fee of INR 1650 Crores by 2 X 4.4 MHz initial allocation (INR 1650 Crores / 4.4 MHz = INR 375 Crores per MHz)
- INR 1650 Crores should be divided by 2 X 4.4 MHz since Initial allocation from 1995 till today is 2 X 4.4 MHz, although in some cases it has been 2 X 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 2 X 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)

Thus the total payment becomes $S \cdot I = \text{Upfront Charge}$

Also, taking into consideration the 900 MHz frequency band being more efficient for multiple services, the charge for 900 MHz frequency band should be double the charge for 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 currently defined. But beyond 2 X 6.2 MHz in GSM and beyond 2 X 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?

Yes, spectrum charges should be reviewed periodically. However, the review should be done in a transparent manner with sound logic and in consultation with the industry.

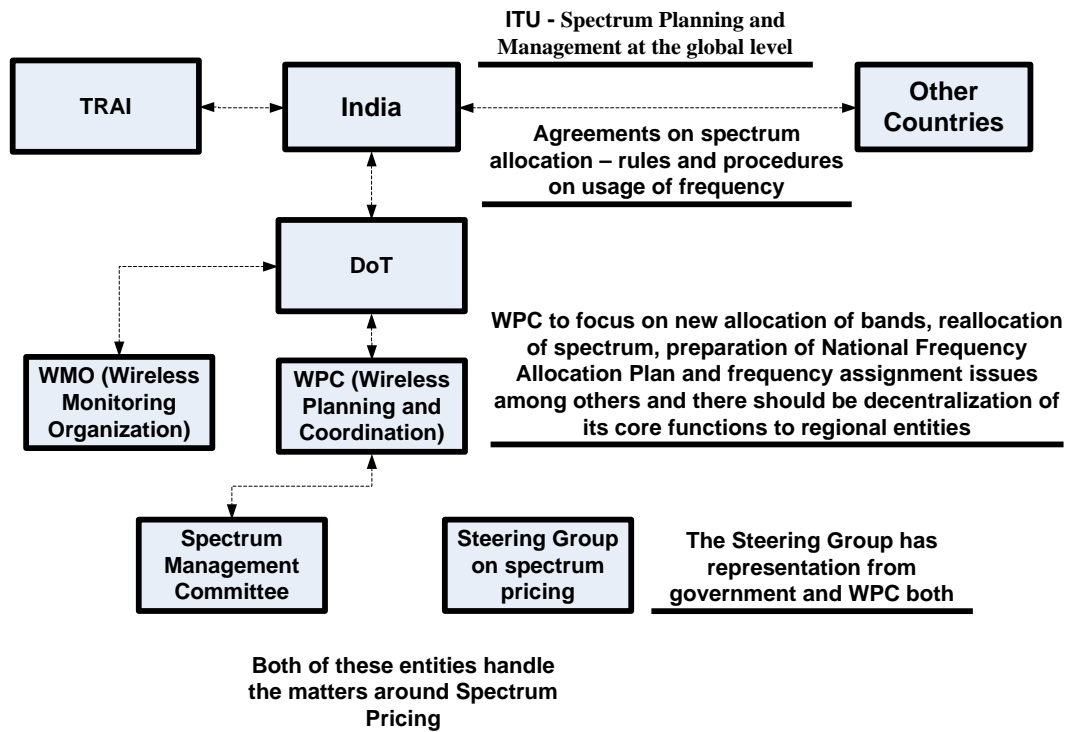
Metrics for assessing efficient usage of spectrum could include fulfillment of roll-out obligations, number of services provided, technology innovations and so on. Non fulfillment of any/ all of these conditions, resulting in inefficient use of spectrum could warrant an upward revision of the spectrum charges and/ or levy of penalties, and even re-farming 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, re- | Increased representation from private entities and enhanced transparency in the formulation of rules and processes around allocation and usage of |

| | | | |
|-------------------------|---|---|--|
| | | farming, handling new frequency bands etc | frequency. Industry Associations should 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 |
| Spectrum Pricing | 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 |
| Monitoring | 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.

A Appendix:

A.1 Circle-wise projected teledensity (%)

| S. No. | Year | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|-------------------|------------------|------|------|------|------|------|------|
| Metros | | | | | | | |
| 1 | Mumbai | 120% | 122% | 123% | 124% | 125% | 125% |
| 2 | Delhi | 145% | 147% | 149% | 150% | 151% | 152% |
| 3 | Kolkata | 109% | 112% | 112% | 113% | 114% | 114% |
| 4 | Chennai | 129% | 131% | 132% | 133% | 134% | 134% |
| Category A | | | | | | | |
| 5 | Gujarat | 52% | 62% | 78% | 82% | 88% | 95% |
| 6 | Maharashtra | 45% | 57% | 74% | 85% | 96% | 104% |
| 7 | Karnataka | 51% | 61% | 73% | 80% | 91% | 103% |
| 8 | Tamil Nadu | 53% | 61% | 74% | 82% | 88% | 95% |
| 9 | Andhra Pradesh | 46% | 51% | 63% | 69% | 74% | 80% |
| Category B | | | | | | | |
| 10 | Kerala | 62% | 69% | 79% | 92% | 104% | 113% |
| 11 | West Bengal | 26% | 30% | 33% | 36% | 37% | 42% |
| 12 | Madhya Pradesh | 30% | 35% | 40% | 45% | 50% | 55% |
| 13 | Rajasthan | 46% | 51% | 53% | 63% | 67% | 70% |
| 14 | Punjab | 63% | 71% | 77% | 85% | 92% | 99% |
| 15 | Haryana | 51% | 55% | 59% | 64% | 69% | 74% |
| 16 | UP West & East | 30% | 35% | 38% | 42% | 47% | 50% |
| Category C | | | | | | | |
| 17 | Jammu & Kashmir | 40% | 46% | 50% | 59% | 65% | 74% |
| 18 | Himachal Pradesh | 59% | 64% | 70% | 82% | 93% | 105% |
| 19 | Bihar | 24% | 30% | 34% | 40% | 44% | 49% |
| 20 | Orissa | 29% | 34% | 37% | 43% | 48% | 53% |
| 21 | Assam | 27% | 31% | 34% | 41% | 45% | 51% |
| 22 | North East | 34% | 39% | 43% | 53% | 63% | 71% |

Source: Internal analysis

A.2 Circle-wise projected subscriber base (Million)

| S. No. | Year | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|--------------------------|------------------|------|------|------|------|------|------|
| Metros | | | | | | | |
| 1 | Mumbai | 23 | 24 | 24 | 24 | 25 | 25 |
| 2 | Delhi | 25 | 26 | 26 | 27 | 27 | 28 |
| 3 | Kolkata | 14 | 15 | 15 | 15 | 15 | 15 |
| 4 | Chennai | 11 | 11 | 11 | 12 | 12 | 12 |
| Category A | | | | | | | |
| 5 | Gujarat | 31 | 37 | 47 | 50 | 55 | 60 |
| 6 | Maharashtra | 42 | 54 | 70 | 82 | 93 | 102 |
| 7 | Karnataka | 30 | 36 | 44 | 48 | 56 | 64 |
| 8 | Tamil Nadu | 32 | 37 | 46 | 51 | 55 | 60 |
| 9 | Andhra Pradesh | 39 | 44 | 54 | 60 | 65 | 71 |
| Category B | | | | | | | |
| 10 | Kerala | 21 | 24 | 27 | 32 | 37 | 40 |
| 11 | West Bengal | 20 | 23 | 26 | 29 | 30 | 34 |
| 12 | Madhya Pradesh | 28 | 33 | 38 | 43 | 49 | 54 |
| 13 | Rajasthan | 30 | 34 | 35 | 42 | 45 | 48 |
| 14 | Punjab | 18 | 20 | 22 | 25 | 27 | 30 |
| 15 | Haryana | 13 | 14 | 15 | 17 | 18 | 20 |
| 16 | UP West & East | 62 | 73 | 80 | 89 | 101 | 109 |
| Category C | | | | | | | |
| 17 | Jammu & Kashmir | 5 | 6 | 6 | 8 | 8 | 10 |
| 18 | Himachal Pradesh | 4 | 4 | 5 | 6 | 7 | 7 |
| 19 | Bihar | 30 | 38 | 43 | 52 | 57 | 64 |
| 20 | Orissa | 12 | 14 | 16 | 18 | 21 | 23 |
| 21 | Assam | 8 | 9 | 10 | 13 | 14 | 16 |
| 22 | North East | 5 | 6 | 6 | 8 | 10 | 11 |
| Total Subscribers | | 503 | 582 | 670 | 751 | 827 | 903 |

Source: Internal Analysis

Methodology:

- Teledensity and existing subscriber numbers from TRAI were obtained for June 2009
- Population statistics was obtained from a report by J.P. Morgan “Indian Telecoms: A New Era of Competition Risk” 14 January 2009
- Population growth considered at 1.5% p.a. to estimate future population for different circles
- Decreasing growth rate for different circle estimated based on existing teledensity levels
- Based on population and teledensity, subscriber numbers estimated for each circles.