November 12, 2009

Dr. JS Sarma
Chairman
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Mahanagar Doorsanchar Bhawan,
Jawaharlal Nehru Marg
New Delhi 110 002

Subject: **Submission of inputs by Dua Consulting on TRAI Consultation Paper No. 6/2009 on spectrum and Licensing issues**

Respected Dr Sarma.

Enclosed please find our response to the TRAI Consultation Paper No. 6/2009 which seeks inputs on the complex issues of spectrum allocation, pricing, M&A and associated licensing terms and conditions.

Our responses are based on immediate cessation of the non-existent first-cum-first serve policy adopted by the licensor which puts an artificial cap against a non-cap open and competitive environment. Our response is also not in favour of the flawed subscriber linking criteria which leads to the hoarding/squatting of the precious natural resource.

Our responses favour a policy framework based on auction, trading/sharing of the spectrum in order to arrive at a fair economic value of this scarce national resource and imposition of spectrum squatting charges, should the licensee appears to be hoarding the spectrum. The auction of spectrum was last proposed in TRAI's recommendation of October 2003. The reasons for the non-implementation of the key recommendations of 2003 are unknown?

In terms of licensing reviews, we suggest delinking of the spectrum and the license as was proposed in the year 2003. We suggest auction of all spectrum distributed after the October 2003 recommendation. A review of the licenses after the expiry of initial tenure, which is 20 years, as well as re-calibrating the spectrum price is also one of our suggestions.

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In terms of mergers and acquisitions, our view is to liberalise the policy once the commercial value of the key resource is established in order to have consolidation in the market place for more efficient utilisation of the key resource. Notwithstanding that the minimum number of players should be governed by the adequacy of competition as well as market share of the players in the arena.

Our detailed response to all the questions alongwith supporting documents is attached for the consideration of the authority for incorporation in their final recommendations.

Should you have any questions, concerns or need clarifications, please do not hesitate to get in touch with us.

Thank you for giving us the opportunity to respond to this very important subject in the telecom space.

With best personal regards

Yours sincerely

12 Nov 2007

B.K. Syngal
Senior Principal

Encl: as above

Inputs by Dua Consulting on TRAI consultation paper no. 6/2009 on 'Overall Spectrum Management and Review of License Terms and Conditions'

Introduction:

This TRAI consultation paper (CP) attempts to be a comprehensive document that addresses a large number of pending regulatory issues. The issues are complex and inter related, therefore the over arching comprehensive approach is likely to address the issues in an integrated manner and will hopefully avoid anomalies that could have arisen if the issues were to be addressed separately.

Issues relating to the complex matter of spectrum allocation and pricing have arisen from time to time and the suggestions of a plain vanilla license and allocation of spectrum via auctions finds its mention in section 7.39 of TRAI October 2003 recommendations. The summary of the same TRAI Recommendation also suggests that a separation between licensing and spectrum allocation should also be considered going forward in the future.

It is difficult to understand as to why this chain of thought was abandoned, both by the policy makers and the Regulator in 2007, leading to the present state of a regulatory and policy muddle. The present regulatory framework also seems to have been established in complete disregard of the various committee reports on issues of spectrum allocation and pricing.

- Key committee reports referred to in the CP include:
    - First Committee: Bandhopadhyay Committee Report
    - Second Committee: Subodh Kumar Committee Report

While the above two Committee Reports have formed the basis of this consultation paper, another committee had also made valuable suggestions in this area. This committee was appointed by the then Member Finance – Ms Manju Madhvan and was to be headed by Mr HP Mishra. It released its report on 7th January 2008 three days before the start of the muddle, but does not find any mention in the CP. We believe that the inclusion of this report has its import in this consultation process. We suggest that it may be termed as the Third Committee.

    - Third committee: The Mishra Committee Report

The committee, which was headed by Mr HP Mishra, seems to have arrived at some very far reaching conclusions with thought provoking recommendations such as e-auction of all spectrum as suggested by TRAI in 2003. The report was released on 7th January 2008, 3 days prior to the commencement of spectrum allocation for the much abused first come first served (FCFS) spectrum allocation process. A copy of the invitation and questions of the committee consultation process and a summary of the recommendations of the committee are attached as ***Annexure 1***. If the TRAI chooses, it can call upon the complete 167 page report from the DoT for its review, as part of this consultation process.

There have been consultations in 2007-2008 on more or less the same subject and the 2007 consultation recommended No Cap/No Auction of 2G spectrum and auction of all other spectrum only to licensees. This recommendation does not seem to reconcile the demand and supply mismatch of spectrum. Under the given framework of limited spectrum, the appropriate and fair way to determine the number of players seems be the methodology of auctions. This recommendation appears to have skirted this key issue. This ambiguity appears to be the genesis of the FCFS methodology of allocating spectrum. However, under the evolving regulatory framework, auction of all other spectrum has been proposed to be de-linked from the UAS licenses, allowing new entrants to gain entry.

It may also be noted that the Prime Minister in December 2007 had openly stated that spectrum allocation should happen in a fair, transparent and equitable manner, with an eye on the accruals to the public exchequer. This clarion call by the Chief Executive of the country was treated with contempt within minutes, and the distribution of spectrum started a month later on the much abused and non-existent FCFS basis. The Prime Minister's speech at India Telecom 2007 in this context is attached as ***Annexure 2.*** We believe that it is never too late to reconsider the regulatory process and move towards auctioning of 2G spectrum. The government in its various affidavits has repeatedly stated that policy changes are its prerogative. In any case, all spectrum distribution was on experimental basis and not many licensees have rolled out services worth the salt. This is a clear case of spectrum squatting with mounting losses to the exchequer. The sale of stakes in two new licensees at multiple valuations, who had not rolled out any network, seems to suggest that their valuation was achieved on the basis of spectrum allocated – this appears to be clear case of spectrum squatting. The nation has been denied the benefits of the digital dividend.

Our approach:

Our approach in the responses has been to adopt a market led process to determine the true economic value of spectrum, which is a scarce national resource and the value of which has been discovered towards the turn of the century, with the realisation of the mistakes dawning now. **These follies have caused losses of mind boggling billions of dollars, which could have been used for re-faming of spectrum and invested in Education and Health of the milieu of the country. The policies have only benefited few speculators, but not consumers.**

Our approach towards M&A and the number of players is to be left to the market, with an eye on the minimum number of players in order to have healthy competition as well as a reasonable level of market share per player to promote a competitive scenario.

Our approach has also been to avoid the hoarding of spectrum and allowing trading and sharing of spectrum, with a fee payable to the government. Allowing trading and sharing of spectrum is likely to lead to better allocation and utilisation of this scarce resource, with revenues accruing to the government out of such transactions. **Trading/sharing of spectrum should also be allowed between public and private players, which include MTNL/BSNL. This could also be extended to other government bodies for meeting their spectrum requirements.**

Our suggestions are immediate discontinuation of FCFS and what is perhaps the most abused spectrum allocation policy based on the number of subscribers, resulting in hoarding of spectrum and the most inefficient use of this scarce natural resource.

Our suggestion thereby is the adoption of a process that results in **allocation of spectrum at market determined prices**. Auctions are one of the best methods which can lead to a market determined price of spectrum. In this respect it may also be noted that the availability of slots for auctions should be uniform across circles and should be made known before the auctions such that prospective participants can evaluate the situation and decide on their bids.

To prevent leakage of revenue, we have also suggested the adoption of a uniform license fee. We have suggested an approach of revenue neutrality for government accruals based on growth of the telecom sector such that a reasonable level of uniform license fee can be arrived at, with an eye on the required growth of telecom services in rural India.

Spectrum requirement and availability

We endorse the regulator's decision of working towards evolving a long term plan for frequency distribution, spectrum requirement and allocation thereof and policy formulation for the telecom sector. **While evolving the aforesaid plan, the regulator must also ascertain the uniform availability of spectrum for pan India players for a harmonised rollout of services as well as the evolving technology trends in various bands of the spectrum so that spectrum management is proactive than reactive.**

Basis for spectrum requirement is taken to be the estimated mobile subscriber base and density as projected in the Report of the Committee for "Allocation of Access (GSM/CDMA) Spectrum and Pricing". The Committee in its Annexure A2 has described the Gompertz model used for these projections. Gompertz model is a well regarded statistical tool for projecting mobile phone diffusion in India; the saturation factor of 120 (K=120) is a well recognized assumption[1].

However, the S-model as a statistical tool for forecasting has its limitations as it does not take into account external factors that may prove to be crucial while determining actual mobile diffusion in a real world scenario. These external factors could be as varied as disposable income to suitability and acceptability of products offered. Moreover, keeping in mind, Indian population's demographics (41.6% of the total Indian population below $1 (PPP) per day[2]), an estimated mobile subscriber base of 1 billion by 2015 is too farfetched. It is however conceivable, if the numbers are treated as handsets in hands of some 700 million vis-à-vis actual users. It is worthwhile to note that in the present regulatory environment, the Indian telecom sector has achieved high growth and very high tele-density in urban areas/metros as also an increased penetration in rural areas, however, the number of connections may not be the best measure of the actual tele-density as multiple connections held by the same person do not reflect the actual proliferation of telecommunications. It is a well known fact that the tele-density of 130 for Delhi and Mumbai does not reflect reality as nearly 20% of the population in these areas do not possess any telephone.

We are of the view, that while projecting mobile subscriber base, regulator has alienated itself from real world scenario. For an average Indian earning close to Rs. 1,500/- per month spending Rs. 150/- on monthly wireless services does not appear to be a convincing

[1] Annexure A2 "Models and Forecast of Mobile Density" from Report of the Committee for "Allocation of Access (GSM/CDMA) Spectrum and Pricing" – May 2009 by Department of Telecom

[2] Source – Millennium Development Goals Indicators – The official United Nations site for the MDG Indicators (http://mdgs.un.org)

proposition. With this reasoning, we feel that while determining future spectrum requirements, regulator should be more conservative in its subscriber base projections.

In ¶ 1.12, the regulator has observed that based on current technology deployed, 582 MHz spectrum will be required for various services in Delhi service area. These calculations have been done with existing technologies. We suggest that moving forward; the regulator must push for use of more efficient technologies to bring down spectrum requirements. Spectrum re-farming would be a step in this direction and has already been adopted by many countries. Since spectrum re-farming would require more concrete thinking, we suggest that regulator must come up with a time line and approach paper for implementing re-farming. Re-farming would make use of more efficient methods towards utilisation of spectrum, which is the need of the hour with spectrum being a scarce national resource. Transition cost during re-farming could be borne by USO fund. During re-farming considerable thought must also be given to the fact that any entity/agency and every user– whether private or government, must pay for spectrum that it uses. No free utilisation and allocation of spectrum on various grounds is to be done in future. A notable example of digital dividend is the re-farming of 700 MHz band in the USA by a legally mandated switchover to digital transmission of TV signals, which freed up huge chunks of frequency in this band. The freed up frequency was then auctioned at close to $ 14 billion, earning the US public exchequer huge digital dividends arising out of re-farming.

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?**

   Usually, mobile density can be analysed using different S-shaped growth curve models. For India Gompertz model adequately describes the path of mobile phone diffusion; the saturation factor of 120 (K=120) is statistically a well recognized assumption.[3]

   However, while formulating policy and way forward, it should be noted that the S model has its own limitations. S-model is a statistical tool used for forecasting. Its accuracy can be improved by projecting frequent data points, but it should be kept in mind that this forecasting technique does not take into account external factors. It is well known that factors such as per capita income, population, competition, price, suitability, affordability and disposable income, etc. have direct impact on mobile density.

[3] Annexure A2 "Models and Forecast of Mobile Density" from Report of the Committee for "Allocation of Access (GSM/CDMA) Spectrum and Pricing" – May 2009 by Department of Telecom

Year (ending Dec)	*Population (in million)*	*Estimated Mobile Density (per 100 Population)*	*Estimated Mobile Subscriber Base (in million)*
2008	*1,167.70*	*28.91*	*337.58*
2009	*1,184.16*	*37.15*	*439.92*
2010	*1,200.86*	*46.54*	*558.88*
2011	*1,217.79*	*55.84*	*680.02*
2012	*1,233.26*	*64.69*	*797.80*
2013	*1,248.92*	*72.86*	*909.96*
2014	*1,264.78*	*80.20*	*1,014.36*
2015	*1,280.85*	*86.66*	*1,109.98*

Table 2

Year Ending (March)	*Projected Wireless Subscriber Base (in million)*
2007	*165*
2008	*261*
2009	*392*
2010	*557*
2011	*730*
2012	*888*
2013	*999*
2014	*1093*

Table 3

While, there is no harm in optimism, however the economic ground realities can not be overlooked. Thus in our view, an estimated mobile density (per 100 population) of 86.66 and 80.20 in 2015 and 2014 is farfetched. Table 2 and 3 above, as reproduced from the Consultation paper, project the wireless subscriber base in the coming years. The above mentioned mobile densities of 86.66 and 80.20 have been projected by TRAI in its consultation paper on 'Determination of port transaction charge, dipping charge and porting charge for Mobile Number Portability' dated 22nd July 2009. In our response thereof, we have already mentioned that subscriber base projections are bloated. With 41.6% of the total Indian population below $1[4] (PPP) per day, a mobile density of 86.66 is too optimistic as well as unrealistic. The likely implication of this is that beyond a certain number, the growth may taper off and the numbers projected in Table 2 and 3 may not be achieved, unless the numbers are treated as handsets (multiple sims) in hands of some 700 million vis-à-vis actual number of users

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

In the early stages of evolution of wireless telephony in India, policy makers were of the view that spectrum required for providing mobile telephony is directly proportional to the

[4] Source – Millennium Development Goals Indicators – The official United Nations site for the MDG Indicators (http://mdgs.un.org)

number of subscribers. Accordingly the subscriber linked criteria (SLC) was followed for further allotment of spectrum after initial assignment.

However, presently India is considered a reasonably mature market. With spectrum being a finite national resource, moving forward it would be advisable that Government pushes for deployment of more efficient technologies instead of normative technologies. Moreover, spectrum requirement is also dependent on the service area as well. A metro such as Delhi will certainly require more spectrum than rural areas. Accordingly, while assigning/allocating spectrum, the regulator must also consider these aspects.

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

As correctly pointed by regulator and ITU (sections 1.32 to 1.36), spectrum re-farming is essential and is the need of the hour due to the developing spectrum crunch. The objective of re-farming is to minimise the usage of spectrum inefficient technologies and push for newer and more efficient technologies either for existing services or for some different services.

In our view, spectrum re-farming must be initiated on an immediate basis. The first step in this direction would be to let spectrum be vacated by non-commercial users including government agencies, which should then be allocated for commercial usage to service providers by way of auction. Initial assignees could be compensated through USO Fund and parts of the proceeds of the auction money, to enable them to deploy newer and more efficient technology in new bands or via the use of optical fibre networks as is being planned for the defence forces. Perhaps, the alternate technologies could be funded out of these proceeds of auction. Let everyone benefit from the digital dividend. There are any number of examples of re-farming the spectrum by auction in US and the European Union (EU). **In US the cumulative accruals have been some US$ 34 Billion in last two years.**

4. In view of the policy of technology and service neutrality licences, 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 licences, how will the spectrum in the 800/900, and 1800 MHz band be assigned to the operators?

In our view, moving forward, the regulator must make the license both technology and service neutral and introduce a plain vanilla license under which any telecom service, without spectrum can be offered (a key recommendation of 2003 de-linking license from spectrum).

The regulator must adopt the concept of a technology and service neutral license. As a part of the same, a service provider must obtain a plain vanilla UASL license, before he bids for the spectrum. This plain license is the toll charge for doing business in the country with the spectrum to be acquired through a competitive process. This will make him eligible for providing telecom and allied services in India. **No bundled assignment of spectrum should be done as a part of this plain vanilla license. Let the license holder bid for spectrum via open auctions.** Upon acquiring spectrum, licensee should be allowed to provide any service using any technology making optimum usage of spectrum. Auction should be carried out to establish the commercial/economic value of the spectrum for all bands.

Initially, spectrum came bundled with UASL license and further assignment was done on the basis of subscriber linked criteria – for 800/900/1800 MHz. This license/spectrum was valid for 20 years period. Majority of these operators have already been operational for 10-12 years.

In our view, upon expiry of license/spectrum validity, further extension should be done only upon payment of market value of spectrum as established by auction of 3G spectrum or any other comparable spectrum auction.

This, clearly, seems to be the approach being adopted in Switzerland as evident from the example below:

Switzerland Starts Preparing for Radio Spectrum Auctions in 2013

Switzerland's Federal Communications Commission (ComCom) has instructed the Federal Office of Communications (OFCOM) to prepare the allocation of mobile radio frequencies which are either currently free or which will become free in the foreseeable future.

ComCom is expected to launch the public invitation to tender for these frequencies in the course of the next year. The allocation of frequencies will take place by auction.

ComCom has instructed OFCOM to begin the preparatory work for the public invitation to tender for mobile radio frequencies which are either currently free or which will become free in the foreseeable future. The invitation to tender is taking place with particular reference to the current GSM and UMTS licences which expire on 31 December 2013 and 2016 respectively. In addition, other frequencies from various mobile radio bands will be available for the provision of mobile radio services. It is intended that an early allocation of these frequencies will offer players in the market a long-term perspective for planning.

The proposed procedure is intended on the one hand to enable any new operators to acquire mobile radio frequencies. On the other hand, existing operators will have the possibility of equipping themselves with sufficient frequencies for the future.

OFCOM will now prepare the tender documentation and the design of the auction for the attention of ComCom. On this basis, ComCom will decide on the next steps and is expected to launch the invitation to tender for the mobile radio frequencies in the course of 2010. The invitation to tender will be open to all interested companies.

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

USA has already started re-farming of the 700 MHz band. The possibility of using the 700MHz band for mobile communications provides a rare opportunity for providing cost efficient wireless solutions for voice, data and mobile TV. The sale proceeds of this band in USA resulted in accruals of nearly US$ 14 billion, the so called digital dividend.

Re-farming for this band should start as soon as permissible. Also, it would be advisable if the regulator can prepare a broad time-line for the same. We would suggest that let

market forces decide usage of this band and the type of service to be provided. Allocation of spectrum can be decided as elaborated in our response to question number 4.

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

In brief the sale of these bands in the USA resulted in US$ 34 billion accruing to their exchequer. Presently, television broadcasting takes place via analogue transmission in India. Shifting from analogue to digital transmission in television broadcasting will free up some spectrum in UHF band (700MHz frequency band) that can be used for other communication services. This is 'Digital Dividend'. Currently there is no digital dividend in India.

USA and European countries have started work in this area. USA has led the way by completing the auction in this band in March 2008 and allocating this spectrum to various players via technology-neutral approach. We are of the opinion that the 700MHz spectrum should be auctioned similarly in a technology/service neutral way.

The prime question for India is which technology will be best suited in this band. With LTE being the technology for future, we suggest that 700MHz spectrum should not be booked exclusively for a single service, but should be kept open to be decided later based on availability of spectrum and practices followed by other countries.

Since, India has limited bandwidth available in other internationally harmonised mobile bands such as the 900, 1800 and 2100 MHz bands, 700 MHz bands should be kept clear right now and moving forward to be utilised in synch with other countries so as to have a harmonised mobile band.

We suggest that the regulator must undertake a comprehensive review of all available bands from 400 MHz to 4000 MHz bands keeping the long term evolution of the emerging mobile technology and its applications. **The regulator has addressed the issue of free spectrum allocations in the 3GHz band. All free allocations must be revoked and reallocated at market driven prices. Also see our comments under the spectrum management section.**

<u>Licensing issues</u>

In its 2003 recommendations, the regulator had wisely suggested to introduce the concept of unified licensing regime along with de-linking of spectrum allocation from licensing.

However, the practice of bundling spectrum along with the license and further assignment of spectrum on the basis of subscriber linked criteria and FCFS has aggrieved and aggravated the existing problem of non-availability of spectrum for providing wireless services. Almost free assignment of spectrum as compared to its market value has done no good towards adoption of superior and efficient technologies for providing such services. Moreover, to keep spectrum requirements in check, capping of maximum operators per circle has also not been given much thought by the regulator. It may also be noted that the current methodology of allocating spectrum bundled with the license at prices, which are way below market prices has led to huge losses to the public exchequer. Therefore either de-link spectrum from license or even if bundled let there be an auction. We believe that de-linking of spectrum is a better option, since it brings in service providers who do not wish to use

any spectrum and allows them to get spectrum when they choose to provide spectrum linked services. De-linking the two, ie spectrum and Licenses would bring in niche players providing newer services as franchises to the spectrum owners for examples MVNOs.

We are of the view that moving forward; the regulator must shift towards de-linking spectrum from the license. A telecom intender can obtain a plain-vanilla license from DoT upon payment of marginal/nominal fees. This license will make him eligible for providing any type of telecom services in India. However, spectrum for providing services should be obtained separately. This spectrum should be allocated to a service provider on the market driven mechanism such as auction or could also be obtained via spectrum trading/sharing

To ensure fair market practices, the regulator must ensure that at all times a pre-determined number of players must always operate in the market. Instead of artificially capping, maximum number of players, let market forces and spectrum available determine the maximum number of players operating in a service area. HHI index determines optimum number of players from an economist's perspective, the distribution of resource determines the highest number of licenses and the competition will determine how many will survive. Keeping the consumer and anti cartelisation in mind the ideal number would be 4 or 5.

7. Should the spectrum be de-linked from the UAS Licence? Please provide the reasons for your response.

Yes, spectrum must be de-linked from UAS License. In its October 2003 recommendation, TRAI has also recommended that moving forward best way is to de-link spectrum from UAS License. Spectrum should be allocated by way of auction[5] as far as possible.

The thinking behind this concept is that let an intender obtain a plain vanilla UAS License from DoT. This license will make the intender eligible to do business and provide any type of service in the Indian telecom market. But the resource/medium for providing such services is to be obtained separately via auctions. The present policy is prohibitive and restrictive for any innovation. It unduly binds the licensees. Is not the Government auctioning Oil Blocks, Coal mines etc?

8. In case it is decided not to de-link 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?

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

We have combined answers for issues number 8 and 9.

In Point 2.4 of the consultation paper, the regulator has cited an eminent technical expert's point that 2x8 MHz is sufficient for an operator (i) to deploy a 2G network with

5 Relevant section from TRAI Recommendation of October 2003:7.39 As brought out in Para-7.37 above, the induction of additional mobile service providers in various service areas can be considered if there is adequate availability of spectrum. As the existing players have to improve the efficiency of utilisation of spectrum and if Government ensures availability of additional spectrum then in the existing Licensing Regime, they may introduce additional players through a multi-stage bidding process as was followed for 4th cellular operator.

reasonable levels of spectrum efficiency, and (ii) to satisfy the subscriber needs in the densest areas. Also, lower allotments leads to substantial loss in spectrum efficiency.

Considering the case of 2G GSM services, total spectrum available is 2x100 MHz (in 900/1800 MHz bands), this gives us 12 slots of 2x8 MHz each. Point emphasised is that 12 slots of optimum efficiency are available for 2G GSM services assuming 2x8 MHz is optimum spectrum for this service. Therefore, should this 12 (twelve) be the maximum number of service providers in that band. The answer clearly is No, going by the HHI theory. Let service providers bid for this scarce resource (bidding should also be permitted for more than one slot as well). Maximum number of service providers should be capped on the basis of optimum level of spectrum slots that are available for a frequency band and not on any arbitrary license based criteria or HHI analysis. Let it be known upfront that this is the number which the scarce resource can tolerate. In order to balance between capex and opex, let them bid for multiple slots for a service. The final number will emerge as per the competition policy.

The minimum number of service providers should be determined and imposed so as to maintain a reasonable level of competition and to avoid monopolistic/cartel formations. This could continue to be at present level (4+1 service providers – 4 private and 1 public or 5 private plus one public).

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?

Maximum spectrum that a licensee can hold should be determined on the basis of subscriber density, traffic requirements for a minimum level of quality of service and extent of its coverage area, as arrived at in the CP. A cap on maximum spectrum held could be considered to prevent the eventuality of the creation of monopolistic/duopolistic structures. If it is felt that this hoarding/squatting is anti consumer; take back the spectrum and bring in additional set of players.

We re-iterate from above, let service providers bid for spectrum slots followed by regular spectrum audits carried out by the regulator. This will ensure optimum utilisation of spectrum and in case a service provider is squatting spectrum, he must be penalised to pay spectrum squatting charges[6].

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

Upon regular spectrum audits, if it is found that an existing licensee has been holding more spectrum than required and is not make optimum use of this scarce national resource, it must be charged spectrum squatting charges and repeated offence over time must result in taking back spectrum from such service provider to bring in new players. In this manner the exchequer is not put to loss and also creates a fear of forfeiture of the spectrum.

[6] Please refer to attached study on Spectrum Squatting in ***Annexure 3***

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

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

We have combined responses for issues 12 and 13.

We suggest that moving forward; spectrum should be de-linked from license. A plain vanilla license should be to be obtained by entities intending to carry out business in Indian telecom market. This license will make the intender eligible to provide any type of service in Indian telecom market without spectrum like the services provided by Mobile Virtual Network Operators (MVNOs). In case a resource/medium for providing such services is required, it is to be obtained separately via auction. The entry fees for such plain vanilla license should be arrived at after considering the existing fees of various licenses at present.

Roll-out conditions should be imposed with spectrum allocated to service providers by way of auction. In case service provider does not hold any spectrum, roll-out conditions need not be applicable. The objective of this is to ensure that no spectrum squatting takes place.

Also, this plain license should stand cancelled if it is found that licensee has not been involved in any telecom activity for 3 years from date of obtaining this plain license.

In case fresh licenses bundled with spectrum are to be granted then the licenses should be allocated via a bidding process as was done for the entry of the 4th cellular licensee and as also recommended by TRAI in 2003.[7] However, it is best to discontinue such spectrum bundled licenses. The entry fee will be governed by whether the license is spectrum bundled or not. If spectrum is bundled, then let the license be auctioned with minimum guaranteed spectrum as was done in 2001, if not, a nominal fee should be charged for the license. Any additional spectrum would come out of an auction price.

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?

It is advisable to conduct regular spectrum audits so that spectrum hoarding/squatting can be avoided. Upon regular spectrum audit, if it is found that an existing licensee has been holding more spectrum than required and is not make optimum use of this scarce national resource, it must be charged spectrum squatting charges and repeated offence over time must result in taking back spectrum from such service provider to bring in additional players to keep healthy competition going.

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

Yes, spectrum should be assigned on the basis of subscriber density, quality of service and usage. It becomes rather difficult to decide for Pan India operators. The

[7] Section 7.39 of "Recommendations on Unified Licensing" issued by TRAI in 2003.

classification is only possible for regional players or metro specific players. For Pan India operators it would be wise to allocate the highest common denominator of spectrum. Accordingly, metros should be assigned maximum spectrum followed by urban and rural areas. But spectrum/annual license fees should be set to a uniform level to avoid diversion of expensive service area's traffic to low fee service area and to prevent other malpractices as elaborated in our responses pertaining to the Uniform License Fee question.

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?

We agree with the regulator's observation that higher levels of spectrum and investment are required for metros and large cities as compared to rural areas. However, service providers also reap higher levels of benefits from these areas only. Also, asymmetric pricing may also result in practice of diverting traffic from expensive service area to low fee service area.

Thus asymmetric pricing should, at best, be avoided such that traffic shifting does not lead to losses in licensing fee.

M&A issues

The present M&A framework of three year lock in was established in April 2008, with the likely objective of not allowing operators to acquire spectrum and then sell equity in the company to existing operators. The idea may have been to prevent windfall gains or to have as many operators to promote competition. That objective has remained illusory to say the least. There have been windfall gains for few speculators and the competition is non-existent. The two key objects of this M&A frame work have proved disastrous. However, it appears from hindsight that the process of consolidation is necessary for the evolution of the industry and mergers and acquisitions need to be permitted, with a minimum number of players being mandatory to promote competition and avoid monopolisation or cartelisation.

M&A activity needs to take into account three key factors including the number of players (ideally 4 to 5) to maintain competition; size of the market share per operator (6 to 7 as per HHI); and optimal usage of spectrum. These numbers in our market seem to have gone haywire, with certain circles having as many as 12 players. It appears that players, who have acquired licenses beyond the optimal-number-of-players point, have done so for the purpose of speculative gains arising out of spectrum being made available at throwaway prices.

In our framework, M&A activity is to be encouraged, with spectrum trading/sharing fee being applicable. Mergers, in our framework lead to the creation of a new entity and acquisitions lead to the cessation of one entity and its absorption into the other. In both cases, we have suggested a framework, which requires payment of fee to the government arising out of merger of spectrum. A healthy M&A policy is the call of the day.

17. Whether the existing licence 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?

The present M&A policy is restrictive. It was a cover up for the governments own wrong doings of distribution of spectrum on the FCFS policy and SLC. Present M&A guidelines were drafted keeping in mind bundling of spectrum with the UASL and further assignment of spectrum on the basis of much abused SLC. The idea was to put barrier for proxy entry/spectrum hoarding by existing licensees.

Moving forward, we suggest the de-linking of spectrum allocation and the UASL and doing away of restrictive M&A conditions to encourage consolidation. With this in mind, we are of the view that spectrum trading as well as spectrum sharing should be permitted by the regulator. Proper spectrum trading charges and spectrum sharing fees should be imposed on such transactions to ensure the accrual of revenues to government out of spectrum trading/sharing.

This will also do away with spectrum restrictions imposed on resultant entity post M&A. Spectrum squatting charges should also be made applicable if resulting entity is not able to utilise net spectrum efficiently. Other restrictions such as number of players remaining in the market should continue to be imposed.

Thus under a new policy framework restrictive conditions should be eased so as not to hamper consolidation.

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?

The lock-in clause for sale in promoter's equity for a specified time period was introduced to prevent fly by night operators from selling equity in the new licensee companies which had acquired spectrum at prices way below market prices established in 2003 without any indexation for 2008. This is likely to hamper consolidation activity in the sector. The licensees have found a way around to beat these lock in provisions.

Auctioning of spectrum and dilution of this clause along with the introduction of spectrum trading with a spectrum trading fee could offset this anomaly when mergers and acquisitions take place. Modifications may be introduced as per our answer to issue 17 above with comprehensive restrictions and penalties on hoarding of spectrum.

However, in the case of an acquisition of a new licensee by a player not possessing spectrum, some sort of transfer fee equivalent to a spectrum trading fee needs to be levied such that revenues accrue to the Government from such a transaction.

It may also be noted that, while the lock in of promoter's equity clause has been introduced, there appears to be a loophole in it as well. As per the attached note in ***Annexure 4*** on the issue, bonus shares can be allotted and offloaded by the promoter, offering him the chance to cash in on the multiple valuation achieved by the company due to the allotment of spectrum at prices that are way below market prices and issue of additional equity at multiple valuation leading to infusion of fresh funds and a swelling of the capital base of the company.

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?

The regulator should consider regulation by market share in terms of subscriber base/AGR (40% at present) as well as spectrum held to regulate M&A activity such that healthy competition is maintained in the market and monopolistic/duopolistic structures are not created.

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

Since M&A would involve transfer of spectrum, spectrum transfer charges should be levied on such transaction and should be of equivalent value as in case of spectrum transfer/trading. However, spectrum sharing is time and bandwidth limited and hence to be of different values.

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?

Spectrum transfer should be considered analogous to property transfer. As in case of property related transaction, every time it changes hand duty is paid to Government. Similarly every time spectrum changes hands, transfer charges should be payable to the Government as a fixed percentage of transaction value.

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

In case of a merger, spectrum held by both the entities will be transferred to a resulting third entry and as such transfer charges should be levied on total spectrum of merging entities.

In case of acquisition, spectrum from seller will be transferred to buyer and as such transfer charges should be levied on spectrum held by seller entity, which is the profiting entity.

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

We are of the view that regulator must not, a priory, limit the maximum spectrum held by an entity but ensure proper utilisation of spectrum through regular spectrum audits and spectrum squatting fee should be charged in case an entity is found deficient in proper spectrum utilisation. Also, minimum number of players in market to be maintained post M&A.

However, an upper limit spectrum cap could be considered to rule out the eventuality of creation of a monopolistic/duopolistic structure, and in order to bring in more competition if the minimum number falls below the threshold level of minimum number of players.

Spectrum Trading

Spectrum trading is a natural progression towards a market driven sector. With precondition of spectrum allocation via auction route, the regulator must consider approving spectrum trading as a viable proposition. Value of spectrum trading transaction should be left as a commercial arrangement between buyer and seller. However, "spectrum trading charges" must be introduced.

Spectrum trading can be considered analogous to property trading. Property valuation is done on the basis of prevailing market conditions. However, every time property is brought or sold, both buyer and seller must pay a part of the valuation to the Government in the form of stamp duty and registration fees. Similarly, "spectrum trading charges" should be leviable on buyer and seller of spectrum. Buyer will now become owner of that spectrum and will be liable for Government pre-conditions associated with spectrum allocation such as roll-out obligation, spectrum audit, spectrum fees, etc related to transacted spectrum tranche. Considering that the auction is the way forward for spectrum allocation in all bands, spectrum trading too should be permitted for all bands.

Technically, it makes more sense if spectrum trading tranche is a multiple of building block based on technology. With a service and technology neutral license, service provider can utilise spectrum to provide chosen wireless spectrum. For example, one service provider may decide to use 700MHz band for high data services, while other may use it for voice communication. Accordingly, there building block requirement would change. It would be advisable if the regulator allows to the buyer and seller to decide how much spectrum they want to trade instead of arbitrarily imposing spectrum trading tranche.

However, in case Government decides to stick to its existing spectrum allocation norms (ie spectrum bundling with license and further assignment on subscriber linked criteria), spectrum trading must not be allowed, as it may result in non-serous players making windfall gains via trading route and exiting the sector. Effectively, if the government takes the retrograde step of continuing to assign spectrum at arbitrary prices, which are not market determined, spectrum trading can enrich private pockets as the spectrum is likely to have been allotted at prices which are below market prices as was the case in the 2008 FCFS related spectrum assignments (distribution or dole outs). Allowing spectrum trading under such a scenario, could lead to new licensees selling out their spectrum at multiple valuations and profiteering at the expense of the public exchequer. This could also defeat the very purpose of having a large number of players and promoting competition and could result in the creation of oligopolistic structures and a rise in telecom tariffs. This can also result in instability in telecom sector along with increase in telecom tariffs.

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

Yes spectrum trading is the need of the hour. As elaborated upon in 1.12, spectrum is not utilised optimally in the case when spectrum allocated in less than 8 MHz. Had the spectrum being allocated in 8MHz slots, requirement of the spectrum trading may have been far less. However, median of the spectrum allocated in various circles is 6.2MHz. As correctly observed by TRAI, efficient utilisation of spectrum is far below the optimal level in this range.

We are of the view that, spectrum trading should be permitted by the regulator so as to evolve optimal spectrum utilisation practices. Spectrum trading should also involve a

spectrum trading fees so as to ensure that Government gets its due share from the trading of this valuable national resource.

This should be done in conjunction with frequent spectrum audits by the regulator to discourage spectrum hoarding. Moreover, a short-term lock-in period could also be imposed similar to present 3 years restriction combined with fulfilment of roll-out obligation to avoid proxy hoarding of spectrum. Also, market forces and applicable technology should be allowed to determine minimum and maximum spectrum that can be traded.

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

Any entity having a plain vanilla UAS license can be permitted to carry out spectrum trading to acquire spectrum to provide wireless services, should they wish. Existing UAS licensees can also be permitted to carry out spectrum trading, such that efficient allocation of the scarce resource takes place.

Thus, plain vanilla licensees can have the option of participating in governmental auctions to acquire spectrum or also have the option of acquiring spectrum in the open market via spectrum trading.

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

No, an original allottee who has failed to fulfil roll-out obligations may also be permitted to carry out spectrum trading in a restrictive manner for the initial lock-in period after he has paid spectrum squatting charge. During post lock-in period full spectrum trading could be permitted subject to rollout obligations having been met or squatting charges having been paid if applicable. The rationale behind this is that on account of negligence/lethargy of one original intender, let the national resource not be left unutilised. Also, the regulator must continue charging spectrum squatting charges and other such applicable taxes/fee on account of non-utilisation of the resource.

Illustration – If initial lock-in period is 3 years, let spectrum trading be permissible in following manner:

Year of assignment of spectrum	% of assigned spectrum that can be traded
1st year	20%
2nd year	40%
3rd year	60%
4th year (no lock-in)	100%

In case, assignee has not fulfilled the roll-out obligation by end of 3rd year, appropriate non-compliance charges such as spectrum squatting fee to be levied on it.

Also, upon spectrum audit by regulator, if by the end of 3rd year, 40% spectrum is lying non-utilised spectrum squatting charges should be levied.

Moreover, spectrum trading (up to 60% for lock-in period and 100% post lock-in period) should attract spectrum trading charges.

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

Yes, spectrum trading/transfer charges to be levied upon spectrum trading. This will be analogous to stamp duty and registration fees payable upon buying and/or selling of property.

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?

Parameter and methodology for spectrum transfer charges are described in illustration of issue 26. Year-on-year determination of such charges can be linked to inflation, though the charge being defined as a percentage of the transaction fee automatically takes into account the impact of inflation.

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

Capping of spectrum has to be on its availability, to be decided keeping in mind the competition and economic viability. It has to be conducted intelligently and not on ad hoc basis. Capping of spectrum of any kind is avoidable, especially if it is being won via auctions at market determined prices or via spectrum trading or sharing. However, in order to deter spectrum hoarding, rollout obligations can be made mandatory and if via spectrum audit it is found that spectrum hoarding is taking place, then spectrum squatting charges can be imposed.

Therefore, a methodology for broad spectrum capping could be considered in order to rule out the creation of monopolistic/duopolistic structures.

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

The tradable block of spectrum must not be defined and should be left to the market forces and minimum spectrum required for the applicable technology. The minimum trading block of spectrum should be as per the building block size of spectrum for the respective technology. For example, 3G has a building block of 2x5 MHz and WCDMA is also 2x5 MHz, while 2G CDMA is 2x1.25 MHz, 2G GSM is as little as 1 MHz, an ISP is 10MHz, etc. Deviation from this can result in creation of unusable chunks of spectrum, which may go waste. Hence, trading in spectrum should ideally be in multiples of building blocks for each technology.

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

It is best to let market forces determine the price at which spectrum is traded irrespective of the spectrum assignment cost. Effectively the price point for each transaction can be reached by a market clearing mechanism, based on the demand and supply of spectrum at a given point of time. The Government should get a share of profit made by the seller via a spectrum trading fee as a fixed percentage of trading transaction value.

However, a distinction may need to be made in the government's share out of spectrum trading based on the assignment methodology followed for the initial grant of spectrum. Such trading fee, which accrues to the government, needs to be much higher where the spectrum has been allocated/distributed/doled out, bundled with the license at prices, which are way below market prices. Such is the case of spectrum allotment via the controversial FCFS process followed in 2008. In this case, the true value of the spectrum, which should have accrued to the public exchequer was not achieved, hence the government's share arising of spectrum trading needs to be such that it goes towards compensating the losses caused to the public exchequer.

Whenever, spectrum is allocated via the process of governmental auctions, a market price for the scarce resource is likely to have been established and the true value for the economic resource is likely to have accrued to the public exchequer. In such case, the spectrum trading/transfer fee need not be as high as in the case where spectrum has been allotted along with the license at prices, which are way below market prices.

Another option that can be considered is that spectrum up to the threshold level ie 6.2 MHz for old operators and 4.4 MHz cannot be used for spectrum trading as it has been obtained at prices that are way below market prices. Therefore, it must be properly indexed before allowing spectrum trading/sharing and after payment of spectrum squatting charge. Other spectrum, that has been harmonised to market prices or has been won via auctions, can be used for spectrum trading. The methodology for harmonising spectrum to market prices has been described in issue no. 49 below.

Spectrum sharing

As mentioned under head of spectrum trading, spectrum sharing must also be permitted given the case that spectrum allocation is done on the basis of auction.

Again drawing an analogy from property transaction from the previous section, spectrum sharing is similar to renting of property to a tenant. Renting is a limited period transaction and due rent is paid by tenant to owner. Moreover, all applicable taxes are paid by owner to the Government.

Similarly, spectrum sharing should be permitted on limited period basis, with commercial arrangements left to the transacting parties. However, Government must receive a share of this transaction by way of "spectrum sharing charges". Since, this is a time limited transaction (say maximum one year), spectrum must be returned to owner at the end of this period. All spectrum related charges should be payable by the owner. However, spectrum sharing must be permitted only once roll-out obligations are met by both owner and tenant. Spectrum sharing for longer periods could be treated as spectrum trading.

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

Spectrum is a scarce national resource. It needs to be used in the most efficient manner due to its scarceness. It is always possible that a particular operator possesses excess spectrum for a period of time. Such excess spectrum could also show up due to spectrum re-farming and evolution of new technologies, which require lesser spectrum.

Excess spectrum lying idle is like a waste of a national resource. Usage of this excess spectrum is also likely to generate AGR for its user, portion of which is payable as license fee to the government. Thus, spectrum being used is better than spectrum lying idle.

It may be best to allow spectrum sharing under an enabling regulatory environment, which benefits the operator, government, mobile customers and the nation. The regulatory environment could include the permission for sharing a certain amount of spectrum held, with a percent of the earnings being payable as a fee to the government. This fee could be called a spectrum sharing fee. The spectrum sharing itself could be left to be a commercial decision between two parties. It is possible that two operators having different target audiences have different spectrum usage patterns. For example, operator A may have peak traffic in the morning and operator B in the evening. Thus, A could borrow spectrum in the morning, while B could borrow spectrum in the evening. Thus, operators could have spare spectrum for various reasons, and permission to share spectrum, would lead to optimal utilisation of spectrum, while earning the government a spectrum sharing fee.

A suggested regulatory framework could allow spectrum holders to share a higher percentage of their spectrum during the initial period of their operation, which should gradually taper off to a lower amount towards the third year of holding spectrum. This could be done with the view that an entity acquiring spectrum may need some time to rollout services and meet its rollout obligations and in the interim, can put up a pre-determined part of its spectrum for sharing with other users such that the following objectives are served:

- Scarce spectrum is utilised and not lying idle
- It earns money for the operator
- It earns revenue for the government

Assuming that a three year timeframe is being given to meet rollout obligations, the following could be the quantum of spectrum that may be allowed to be shared:

Year 1 – 70%
Year 2 – 50%
Year 3 onwards – 25%

Thus, a minimum percentage of the spectrum may always be allowed to be shared such that any additional spectrum that the operator may have can be put to good use, while it also enhances government revenues due to its utilisation. The framework above is only for the purpose of illustration and keeping various regulatory issues in mind and an actual framework will need to be established.

However, spectrum sharing should be allowed within a timeframe, such as not to encourage players to consider it as a permanent way of hoarding spectrum.

Thus to enable optimum utilisation of spectrum in short term, spectrum sharing could be permitted by the regulator. A spectrum sharing fees could be imposed, on basis of time and bandwidth shared. The regulatory framework must ensure that sharing is only for short term.

It may also be added that if spectrum hoarding is taking place, spectrum squatting charges should automatically kick in post the three year period as defined above.

33. What should be criteria to permit spectrum sharing?

Spectrum sharing may be best left to market forces under a defined regulatory environment and operators may be allowed to share any excess spectrum that they may have.

Thus, all operators possessing spectrum could be allowed to share spectrum as per the adopted regulatory norms, which could be developed as has been illustrated in 32 above subject to a time limit to prevent proxy spectrum hoarding.

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?

Spectrum sharing charges may be defined as the fee that accrues to the government arising out of a spectrum sharing arrangement made by two operators. The spectrum sharing charges need to be determined in a way that they automatically factor in inflation and is based on the total value of the spectrum sharing arrangement made by the two operators.

Thus, it may be ideal to arrive at spectrum sharing charges that are a percentage of the charges being paid by the party that is hiring spectrum under the spectrum sharing arrangement. The charges should be made payable by the party that is receiving the money under this arrangement.

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

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

We have combined responses for issues 35 and 36.

This question has been answered from the perspective of the spectrum giver and does not address the issue of rollout obligations of spectrum receiver, who is assumed to have met his roll out obligations.

Spectrum is acquired by a user for rolling out services. Spectrum is not given by the government for indulging in speculation. Hence, meeting of rollout obligations should be the onus of the spectrum owner. Sharing may only be permitted for unutilised spectrum such that the usage of this scarce resource is optimised. All rollout obligations as per the defined regulatory environment should necessarily be met, if not met spectrum squatting charges must kick in.

In case of the spectrum receiver, in order to prevent spectrum hoarding it may be considered if the receiver should be permitted to access spectrum via sharing only if he has fulfilled rollout obligations and really needs this additional resource.

Perpetuity of licences

The issue of perpetuity of licenses needs to be firstly tested from the prospect of the seriousness of the player. Since, our framework is based on a plain vanilla license, it could be granted in perpetuity. The entry fee for the Plain Vanilla license can be reviewed from time to time depending upon the state of the market. However, the term period of the spectrum is not to be linked to the life of the license as spectrum needs to be won separately via auctions. Thus, serious players can obtain a license in perpetuity and then obtain spectrum via governmental auctions or via spectrum trading. In this respect it may be stated that holders of spectrum should be given priority for reallocation of spectrum such that they can maintain continuity of business under their perpetual license. While, priority may be given, it is essential that market determined price of spectrum is achieved during the reallocation process. The spectrum thus won should have a life cycle beyond which it would have to be won again with priority for the incumbent.

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

Since license given is assumed to be a plain vanilla license and without any spectrum, it can be given in perpetuity, with the condition that if no service is rolled out in the first three years of acquiring the license, it stands cancelled. This clause is for testing the seriousness of the licensee. For new licensees, who win spectrum in auction, there should be a time limit on the spectrum tenure along with meeting the roll out obligations, failing which spectrum squatting should kick in.

For existing UASL holders with assigned spectrum their license can be de-linked from spectrum at the time of renewal and spectrum charges can become applicable as determined in the closest auction. This will put them at par with the new players with plain vanilla license.

38. What should be the validity period of assigned spectrum in case it is de-linked from the licence? 20 years, as it exists, or any other period

Spectrum should be allocated in a way such that an operator is able to formulate its business model for a definitive period of time. A timeframe that serves this purpose could be considered as suitable. The timeframe should also take into account, how the market value of spectrum is likely to change over the period and if checks and balances need to be built such that there are no losses to the public exchequer. Let there be a review of spectrum allocation and consequent charges after 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?

Spectrum allocation should be for its entire validity (say 20 years) period irrespective of the remaining tenure of the existing license as the operator will need to formulate its business model. A methodology for enhancement of the tenure of the license may need to be worked out in this regard.

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?

Extension of spectrum should be done at a re calibrated price to the user such that business continuity can be maintained. The re-calibration can be done based on closest auction prices achieved around the time of renewal and taking into account inflation. This needs to be done in a way such that the true value of spectrum is achieved and there is no loss to the pubic exchequer.

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

The same license holder should be given priority for re-allocation of spectrum, such that business continuity can be maintained and the business or its customers do not suffer. However, the allocation must be re-calibrated at prices linked to inflation and closest auction prices such that there are no losses to the public exchequer.

Thus, serious players can obtain a license in perpetuity and then obtain spectrum via governmental auctions or via spectrum trading. In this respect it may be stated that holders of spectrum should be given priority for reallocation of spectrum such that they can maintain continuity of business under their perpetual license. While, priority may be given, it is essential that market determined price of spectrum is achieved during the reallocation process.

<u>Uniform License Fee</u>

The issue of uniform license fee has been making the rounds for some time now due to the potential chances of revenue leakage. Integrated operators are in a position to shift some of the revenues in their books from services that attract a higher license fee to a service that attracts lower license fee resulting in losses to the government.

The annual license fee, at present, ranges from 6% to 10% of AGR depending upon the service and the circle of operation. For example, ILD/NLD/ISP services attract a flat fee of 6% of AGR irrespective of the circle, where as cellular based AGR attracts 10% of AGR as license fee for the metro circles and a 6% fee in rural circles. Their data traffic covered under ILD/NLD/ISP licenses also attracts a lower license fee. This provides a potential to shift some of the revenues of voice traffic that attract a high license fee to lower segment such as NLD or data, such that license fee payout decreases.

In view of this revenue leakage potential, it may be prudent to introduce a uniform license fee. While arriving at a uniform license fee, it is important to keep in mind that the key objective of rapid telecom penetration in rural areas (C-Circles) should not be compromised. Moreover, the rate for the uniform license fee should be determined at the level, where revenue neutrality for government's accruals from this fee is maintained. This implies that broadly, the revenues that the government is receiving from the license at present, should be maintained after the introduction of a uniform license fee. Thus the evaluation of the uniform license fee that needs to be imposed requires that growth rates in various services and service area wise are evaluated and their impact on AGRs is considered, while arriving at the new fee. Our illustration in response to issue 44, below suggests that a fairly low level of uniform license fee can achieve the same revenues as the government is earning under the present license fee structure, because of higher growth potential in rural and some other areas.

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

The clear advantage of a uniform license fee is that the potential for revenue leakages is minimised. In order to do away with the multi-tier license fee, the DoT has proposed a uniform license fee of 8.5% of AGR.

A uniform license fee may require an increase in the lower most brackets of 6% leading to some disadvantages. One of the perceivable disadvantages of the proposed license fee is that for standalone NLD/ILD operators, it implies a rise in the fee from the present 6%. While, for mobile operators, it may not really matter as they pay 10% in certain circles and 6% in others, a move to 8.5% or any number arrived is likely to balance out for them.

A sudden increment of license fee in C-Circles from 6% to 8.5% as proposed by the DoT may also be detrimental to the growth in C-Circles as these are tariff sensitive circles. A higher license fee in these circles, which constitute rural areas, is likely to put an upward pressure on tariffs. Rural India is extremely price sensitive and if growth in these areas is to be achieved, operators must have the flexibility to lower tariffs. A high license fee does not help this.

Thus, the DoT proposed uniform license fee of 8.5% can be detrimental for those providing standalone services. Also for segments where the license fee is 6%, an increase will not be conducive for telecom growth especially in C-circles or rural India.

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

It may be appropriate to adopt a uniform license fee elaborated in 41 above so as to prevent revenue leakages, which becomes specifically pronounced, in the case of vertically integrated players, who have the opportunity to transfer revenues from one service to another to reduce their license fee outflow. Making it uniform across service areas will also block the possibility of operators parking traffic of a higher license fee circle in a lower license fee circle. For example, an operator can park part of Mumbai circle traffic in the adjoining Maharashtra circle. If the license fee for an adjoining circle is lower than another adjoining circle, the operator can lower its license fee outflow using this methodology and cause losses to the public exchequer. Thus it may be prudent to have a uniform license fee across services and service areas.

However, different **registrations** may need to be treated as a separate category, depending upon the nature of their offering. Companies that need to register usually either provide services to LSPs or need to seek all telecom related services from LSPs.

For example, the objective of the inexpensive OSP registrations was to provide a boost to call centre/BPO related commerce. Additionally, the registration helped keep a track of the call centre/BPO business from the national security angle as a substantial chunk of it involved the exchange of data with foreign countries. Imposing licensing conditions like an annual license fee may defeat the purpose of providing a boost to the call centre/BPO business. With the outsourcing industry being an important source of employment in India, increasing its costs via a licensing fee may not be a prudent step.

It may also be noted that OSPs need to take Telecom Resources from Licensed Service Providers (LSP) and pay the LSPs for such Telecom Resources. These payments by OSPs to LSPs get included in the AGR of the LSPs and thereafter the license fee is paid to the government by the LSP based on its AGR. Thus, payments made by OSPs towards telecom related services to LSPs already have a component of license fee that is paid to the government by the LSP. Hence, from this perspective also, an OSP could continue to be a registration.

Another kind of registration is the IP-I registration. Companies providing passive infrastructure to licensed service providers are required to obtain an IP-I registration. It may be noted that license fee is paid by operators, when they use passive infrastructure by installing their equipment, which permits telephony and generates revenues that get added to the AGR. Passive infrastructure also needs to be encouraged to proliferate rapidly for enhanced growth of rural telephony and imposition of additional fee on it can slow down its growth and is thus avoidable. After all, IP-I registries are expanding capital for the creation of infrastructure.

Thus in the case of the above mentioned registrations, licensing and imposition of a license fee does not appear to be necessary.
Future technologies will lead to convergence, wherein only 2 kinds of operators will provide services which will either be access to media or access to services. Access to media may also cover provisioning of infrastructure providers.

With this in mind, we are of the view that Government must do without multiple service dependent licenses. Emphasis should be on making regulatory framework both technology and service independent. This would in turn mean that there should only be one license that permits access services via any mean (2G, 3G, wires, optical fibre, WLAN, etc) and there should be single registration for any and every type of service provisions (facsimile, on-demand, internet, VAS, OSP, etc).

At the same time it may be added, spectrum allocation and licensing need to be separated and spectrum needs to be won by a licensee via governmental auctions or should be acquired via spectrum trading or sharing.

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

The rate for a uniform license fee needs to be determined in a way that it remains revenue neutral for the government and at the same time does not impact operators and customers in a big way. Any uniformity in license fee must include growth in areas of operation and other businesses. It must not be another linear arithmetic fix.

However, it may be prudent to introduce the change in the license fee in a way that the pain is minimised. Thus, changes in the license can be brought about gradually, such that it remains revenue neutral and the gradual pace ensures that the process becomes less painful.

The following table attempts to capture the impact of implementing a uniform license fee. As per the table, a uniform license fee of 7% leads to the generation of approximately the same license fee that is being generated with the given differential fee structure of 6%-10% of AGR at present.

The table is based on the following assumptions:

1. License fee at present: 10% for Metros and Circle A; 8% for Circle B; 6% for Circle C
2. Present AGR contribution: 20% by Metros; 38% by Circle A; 32% by Circle B; 10% by Circle C
3. Approx AGR has been computed based on Q3 2009 AGR of Rs 28940 x 4
4. Approximate AGR by circle has been computed as per contribution amounts indicated above in 1.
5. Rate of growth of AGR has been assumed at 20% per annum based on Q3 2009 AGR growth rate. Based on this and the AGR contribution as in 1 above, new AGRs for respective circles have been computed for a year's growth.

Based on this growth, license fee at the uniform rates of 6%, 7% and 8% have been computed. The license fee based government revenues at the license fee of 7% are approximately the same as the present total license fee based revenue.

Circle	**Metro**	**A**	**B**	**C**	Total
License fee	10%	10%	8%	6%	
AGR contribution	20%	38%	32%	10%	100%
AGR approximated	23152	43989	37043	11576	115760
License fee at present	2315	4399	2963	694.56	**10372**
New AGR @ 20% growth					147969
AGR contribution	29594	56228	47350	14797	
Lic fee @ 6%	1776	3374	2841	888	8878
Lic fee @ 7%	2072	3936	3315	1036	**10358**
Lic fee @ 8%	2368	4498	3788	1184	11838

This methodology suggests that the uniform license fee does not necessarily need to be jacked up to the median of 8.5%, suggested by the DoT as a minor or even zero increase may be sufficient to earn the government the revenue it is earning from license fee at present after taking into account the growth of telecom services in C – circles and ILD/NLD/ISP services.

A recent news report in the Times of India dated November 10, 2009 on the issue of spectrum fee, is much in line with our working above and suggests that there is sufficient growth in telecom license fee, which can help adopt a low uniform license fee, which would be conducive for the rapid proliferation of rural telephony. The referred news report is attached as ***Annexure 5.***

Effectively it may be stated that it is essential to implement a uniform license fee to prevent revenue leakages. However, such a license fee needs to be computed taking into account the growth in the telecom sector and its impact on AGRs, such that the license fee based revenues to the government remain at the same level and that the objective of growth of rural telephony is not hampered and the overall growth of the telecom sector is maintained.

Spectrum assignment

Assignment vs. allocation - Here it may be stated that if the original methodology was termed as an "Assignment" as spectrum was distributed, bundled with the spectrum, future allocations need to be done via auctions and could be termed as "allocation" instead of assignment. In our framework, we have suggested the separation of licensing and spectrum and allocation of spectrum via auctions. We have also addressed the issue of a level playing field between old 2G operators and new licensees in case spectrum auctions for 2G are adopted.

While, suggesting the discontinuation of the SLC for assignment of spectrum, we have suggested that all spectrum, including that for non-commercial usage needs to be allocated at market determined prices.

It may be noted that it is the prerogative of the government to change policy as stated by it in various affidavits as well. In any case all spectrum assignment in 2008 or before is reportedly or a trial basis and subject to the proviso that its allocation can be determined by any other pricing mechanism. We are therefore of the firm opinion that all spectrum allocated post the 2003 TRAI recommendation should be auctioned as per the recommendation.

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

The recent allocation of 2G spectrum at prices determined in 2001 has caused sufficient controversy. It would be wiser for any further spectrum allocations to be made at prices that are market determined and not via the FCFS process with bundling of spectrum with licenses.

The best way to achieve market determined prices is via open and transparent auctions. This would ensure that the dues to the public exchequer from a national resource are not squandered and go towards enriching private pockets.

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

It appears to be difficult to withdraw the initial spectrum granted to mobile operators bundled with the UAS license. The quantum of this has been established to be 6.2 MHz for old licensees and 4.4 MHz for new licensees. While, this may be allocated to UAS license holders, irrespective of SLC, but subject to rollout conditions, any further allocation of spectrum should be via the process of auctions. As a matter of fact, we suggest that these (beyond 6.2 and 4.4) assignments or thos distributions post 2003 (including the January 2008) distributions should be either indexed or auctioned.

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

In the case of UASL 2G spectrum, the committed amount has been established to be 6.2 MHz/4.4 MHz. A two tier mechanism would require that any spectrum allocation beyond this amount is via auctions. We suggest auction or indexation for all licenses and spectrum allocated post 2003. A policy change is government prerogative. This step must include the combination of technology licenses as well. They have no business to

be getting the dual technology spectrum having made a choice of technology and a declaration that they have less than 10% stake in other technology

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

GSM spectrum should be assigned in multiples of building blocks, which could be as low as few khz. The optimal spectrum that an operator needs has been determined to be 8MHz by certain studies. If this has been established to be the optimal amount, it may be considered as the spectrum for initial allotment. Further spectrum allotment can be considered in terms of building blocks. A1 MHz tranche should be adequate for 2G GSM technology and 1.25 MHz for CDMA a technology.

In any case all allocation of spectrum should be via the methodology of auctions as far as possible.

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?

Where would there be the issue of level playing field amongst licensees who have different amount of spectrum holding? The licenses in 2008 were distributed against a non-existent FCFS policy and by putting artificial caps against a no cap recommendation of the regulator. The government has full right to bring in policy changes for the benefit of consumer and for maximising accruals from scarce national resource. Therefore, two mechanisms have been suggested:

1. As it has been established that the quantum of spectrum to be provided bundled with the license is 6.2MHz for pre 2008 licensees and 4.4 MHz for post 10 January 2008 licenses, any spectrum held beyond the threshold level for pre 2008 licenses, operators should be asked to pay the price that is determined via 3G auctions. For post 2008, all distribution of largesse must be as per market driven mechanism. If operators are holding excess spectrum, and they would not like to use it, they can be given the option of surrendering the excess spectrum. This mechanism is likely to put this scarce national resource to the best usage.

2. Another mechanism that can be considered is to announce that all allocation of 2G spectrum beyond the threshold level (6.2MHz/4.4 MHz) should be via the process of auctions. Those operators, who possess spectrum beyond the threshold level and those operators wanting spectrum beyond the threshold level, would need to participate in these auctions such as the market based price of 2G spectrum is determined. For 2008 assignees let the price be suitably indexed to 2003 prices.

   Those operators already holding 2G spectrum beyond the threshold level would need to pay the price achieved at these auctions, indexations and those who need fresh spectrum would have won it via these auctions.

   This methodology is likely to address the issue of levelling the playing field.

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

The continuation of SLC criteria is considered most inopportune, un-scientific and subject to gross abuse has been adequately proved. SLC criteria is unlikely to do justice as an allocation methodology as evolution of technologies leads to more efficient usage of spectrum and only a market based pricing system can lead to an equitable transparent and fair allocation methodology. SLC is likely to get outdated very quickly due to evolution of technologies and its re-evaluation at each interval can become a cumbersome process as well as arbitrary. Spectrum allocation is best left to the market and the method of auctions appears to be the ideal methodology for determination of a market based pricing. This will also ensure optimum returns to the public exchequer for the scarce national resource. Effectively, the SLC based criteria appears to be redundant and must be discontinued. We are the only country using this criterion for spectrum distribution.

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?

For usage other than commercial, which could include usage by governmental agencies, spectrum charges should be equivalent to prevailing market prices determined via auctions. While, priority spectrum may be granted to them based on national interest, its pricing must be done in a way that the scarce resource gets a fair return for its usage.

Spectrum pricing

As suggested in the previous section, pricing of all spectrum needs to be based on market demand and supply and should not be at administered prices decided by the government. Spectrum pricing must reflect current market conditions, such that the resource is allocated efficiently and that the public exchequer receives its dues. Spectrum pricing must also take place in a free market environment, where spectrum trading/sharing is possible such that artificial scarcity is not created due to spectrum hoarding.

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

As elaborated in 49 above, a one time charge should be levied for any spectrum held by operators beyond the threshold limit.

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?

Date of calculation of charge should be from the date the spectrum has been granted such that the charge becomes applicable for the entire tenure of the spectrum. At the point of expiry of the tenure of the spectrum grant, a re-calibrated price needs to be levied that takes into account inflation and closest established auction prices.

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

The 3G auction price appears to be the best benchmark at this juncture as it will establish a market based price for spectrum.

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

Annual spectrum charges should be technology neutral and based on the revenues of the operator. This is likely to ensure that spectrum is allocated by market forces in the most optimal way. Since charges are to be based on revenues earned due to usage of spectrum, operator is likely to ensure its optimal usage.

A minimum annual spectrum charge can also be levied based on the quantum of spectrum held so that it acts as a deterrent against spectrum squatters[8].

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

Spectrum charges may need to be reviewed from time to time as usage patterns can change due to technological shifts. It may also be necessary to bring about changes in spectrum charges due to any regulatory loopholes that may be discovered. Thus, a review of such charges once every two years could be considered. However, it may be noted that ad hoc reviews of spectrum charges could also be undertaken to remove any regulatory anomalies.

Structure for spectrum management

Spectrum management requires the efficient management of spectrum in order to optimise resource allocation and maximise returns to the public exchequer. The approach for spectrum management needs to take into account various issues such that an efficient spectrum allocation mechanism is achieved. These issues include a rapid change in technological advancement, leading to changing spectrum requirements. Evolution of technology can lead to a lesser requirement of spectrum for the same service or a new technology can demand spectrum that may have been allocated to another service. Spectrum management also needs to take into account requirements of non commercial users like the government including the defence forces. These facades of spectrum management necessitate that spectrum be allocated in an optimal way such that this scarce and precious national resource is not wasted and that its true economic value is recovered and accrues to the public exchequer.

Spectrum management also needs to take into account the interest of the consumers. Thus, spectrum management needs to consider pricing aspects of final services provided by telecom operators based on spectrum. As of now, data services are being charged on a time based system, for the amount of time a subscriber uses the service and thereby spectrum. This is the case for both voice and data as of now. While it may be suitable to continue the practise for voice as it usually entails a conversation and uniform usage. In the case of data, volumes of data transmitted and received can vary substantially depending upon the types of files and their sizes, which in turn determines the usage of spectrum. Thus, it may be prudent to shift to a process of billing by usage of bandwidth along with dynamic allocation of bandwidth. **It may be appropriate for the TRAI to**

[8] Please refer to attached study on Spectrum Squatting

initiate a separate consultation process for charging for digital services on the basis of kilobytes as is the case for consumption of electricity measured in kilowatts or that of water in units.

Thus decisions regarding spectrum management cannot be knee jerk decisions such as the latest spectrum allocation via the FCFS methodology. In this regard it may be noted that the ITU, which use to hold a conference every 10 years to discuss global spectrum management issues, now has started to hold such conferences more frequently.

Given the state to regulatory mess that India is in, it would be our belief that the lost ground needs to be covered and that we need to align our spectrum management in line with global policies, which take into account technological evolution and in order to align international bands vs services offered with our bands and services for efficient spectrum management. In this regard, attached as ***Annexure 6,*** is a presentation on LTE, presently being debated in the EU.

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

As stated above, one of the key objectives of spectrum management should be to allocate spectrum in the most efficient manner as it is a scarce national resource, accommodate as many players as possible to promote the spirit of competition such that tariffs stay low and the consumer benefits. These objectives need to be met such that the returns to the public exchequer are maximised.

This approach requires the evaluation of the maximum amount of spectrum available for various services. The optimal quantum of spectrum required for each service needs to be established as well such that the maximum number of players that can be accommodated can be determined.

Thus, if for a particular service, 50 MHz of spectrum is available and the optimum quantum per player is 10 MHz, then 5 players can be accommodated for the service.

This structure can lead to an efficient and organised spectrum management structure, instead of an ad hoc system, where spectrum allocation is based on criteria like the SLC.

After the quantum of spectrum and the number of players that can be accommodated has been determined, serious players, with pre-defined credentials should be allowed to bid for spectrum and the 5 highest bidders as per the example above, who have passed the technical bid, should be allocated the spectrum. There should be no-cap on the number of players who are allowed to bid, such that the returns on the scarce national resource can be maximised. Let there be clear road map for all services and owners of spectrum in 400 MHz to 4 GHz bands.

There have been certain free allocations of spectrum, which cannot be justified. Such allocations need to be revoked and should be re allocated via an auction based process. **Almost free assignment of spectrum as compared to its market value on various grounds (non-commercial activity, new technology, etc) has not led to the adoption of superior and efficient technologies for providing such services. This practice must be dis-continued. Emphasis must be put on adoption of efficient technology and making bands service neutral. For example if a particular band can be utilized for 2-3 types of services, then it may so be permitted.** There have been instances wherein one service is allocated much more spectrum in bands that could be used for providing other services as well. For example, band presently exclusively reserved for ISP providers can also be utilised

for Wimax and broadband services. This practice of band reservation for particular type of services must be discontinued on an immediate basis. A service neutral approach must be adopted instead, which will help in averting artificial spectrum crunch.

Spectrum management also needs to take into account that to compete nationwide in offering mobile broadband services an operator is best placed if it holds a mix of frequencies both below 1GHz and at higher frequencies such as (varying somewhat by country and region) 1800 and 1900 MHz, core 3G (1.9/2.1GHz), AWS (1.7/2.1GHz), extension 3G (2.6GHz) and future higher frequency allocations. Frequencies below 1 GHz are not only well suited to providing coverage more economically (fewer base stations) in rural regions, which supports public policies aimed at deploying universal coverage, but they also offer better in-building penetration than higher frequencies. Since most mobile data communications take place indoors the ability to provide indoor coverage as economically as possible is important. However the major valuable frequencies for mobile communications below 1GHz (850 or 900 MHz; 450 MHz is less important) that were attributed for voice services, but can be and are already being used in many countries for broadband services, are held by the original cellular competitors. There are typically two such "originals", including in most cases automatically the incumbent telephone company, who acquired this spectrum at no cost and before auctions became a common method for awarding spectrum.

Some international examples of evolution in the spectrum allocation process:

In the case of the US, "Digital Dividend" spectrum will become available (700MHz or 800MHz as it is referred to in Europe) after the planned transition to digital broadcasting takes place. Current and potential mobile competitors argue that the original cellular operators should be restricted in their access to this new spectrum below 1GHz, or they themselves who currently have none will be placed at an unfair competitive disadvantage. In the U.S. where no limitations on bidders were included in the 700 MHz auction the bulk of this valuable spectrum was indeed acquired by the successors of the original cellular competitors, namely Verizon Wireless and AT&T. The situation regarding spectrum below 1 GHz is being debated in the U.K. (and elsewhere), and a compromise sought (return of some existing 850/900 MHz attributions and/or caps on spectrum holdings below 1 GHz) that will ensure effective competition between a number of mobile operators greater than two. Even the auction of 2.6GHz spectrum in the U.K. has been delayed for this reason among others. Newer mobile competitors and regulators can argue that since no competitor can compete fairly without access to frequencies below 1 GHz operators who do not hold such spectrum already cannot reasonably value 2.6GHz spectrum for the purpose of deciding how much to bid until and unless they know whether their competitors who do hold such spectrum will or will not be restricted in bidding for additional frequencies (800 MHz) below 1 GHz.

In essence, the issue of spectrum management requires that the regulator should evaluate the current situation along with key objectives of spectrum management and develop a policy that takes into account international trends so as to arrive at a regulatory environment that is enabling for growth of telecom and other spectrum related services.

Annexure-1

MOST IMMEDIATE

GOVT. OF INDIA
Ministry of Communications & IT
Department of Telecommunications
(WPC Wing)

6th floor, Sanchar Bhavan,
20, Ashok Road, New Delhi - 110001
Dated the 30th August, 2007

No.R-11014/30/2007-LR

OFFICE MEMORANDUM

Subject : Committee for spectrum valuation & pricing–Circulation of main points amongst the stake-holders for their views.

The Departmental Committee, constituted to examine the issue of spectrum valuation / pricing, taking into account the existing practices and other relevant aspects and to recommend an appropriate/fair valuation/pricing of spectrum, invites views of various stakeholders on the main points included in the Questionnaire enclosed as Annexure.

2. The views may kindly be provided to the undersigned within a week's time, latest by **06.09.2007**. A **soft copy** of the response, may also be simultaneously emailed at the following five email addresses :

i) mishrahp@gmail.com
ii) Jwapp.wpc@gmail.com
iii) ddgvas@gmail.com
iv) varadakrishnan@gmail.com
v) dwar.wpc@gmail.com

30/08/2007

(R. K. Saxena)
Deputy Wireless Adviser (Regulation)
Tel : 2335 9561

To,

All Major Users etc.

RATNUS

N.O.O.
CC for information :
i) The Chairman and members of the Committee
ii) PPS to Member (F/T)
iii) PS to Wireless Adviser

ANNEXURE

Questionnaire

1. How best should radio frequency (RF) spectrum be *valued*, considering that its *value* depends on numerous variables like the spectrum bands involved, technology deployed, investments required and made, types of services offered and demanded, level of competition, etc.?

2. Should the *pricing* of spectrum be based on its *valuation*? Why, or why not?

3. As the *value* of spectrum would change from time to time, what mechanism would you suggest should be adopted to ensure that it gets properly reflected in the *pricing* of the scarce RF spectrum resource?

4. How best should the spectrum be *priced*? Should it be based on formulae, revenue-sharing, auction, or a combination of two or more of these approaches? Please justify your response.

5. In your considered opinion, do the *existing* RF spectrum charges – which are formula based or revenue share – need to be modified to ensure the most effective use of the scarce RF spectrum?
   a. If not, why?
   b. If yes, please give your views in the matter, taking into account the need of arriving at similar levels of charges through different methods?

6. Need and methodology for *differential pricing* of various parts of the RF spectrum (frequency bands), taking into account the *level of demand* (high, medium or low), so as to encourage the spectrum users to move away from highly congested parts of the spectrum?

7. How should the spectrum bands be *classified* so as to use *pricing* as a tool to decongest over-demanded parts of spectrum?

8. Should the *assignment and pricing* of spectrum be based on *different criteria* for metro, urban and rural areas of the country, taking into account the levels of current & potential usage (high, medium or low) and the need to encourage growth of spectrum-usage in rural areas?
   a. If not, why?
   b. If yes, please suggest:
      i. the criteria for such assignment and pricing, and
      ii. the *definitions* of metro, urban and rural areas that should be used.

9. To what extent should the following criteria *affect pricing of spectrum*?
   a. Demand and supply situation?
   b. Socio-economic benefits of the particular *service(s)* for which the spectrum is assigned/ used?
   c. Funds needed to release spectrum for commercial use (*refarming*)?
   d. Revenue needs of the government?

10. In your opinion, what strategies (pricing, *and* other) are most likely to ensure the most effective use of the *latest technologies* so as to achieve efficient and effective use of spectrum in congested areas?

11. What should be the *determining criteria* for initial assignment of spectrum, especially in those bands where it is (or is going to be) particularly scarce in relation to demand?

12. Should the *present practice* of assigning (on the basis of subscriber-base) "additional" spectrum to existing mobile operators (and also its pricing) continue? Give reasons to support your answer.

13. Would you like to suggest any quarterly/ annual spectrum charges for *subscriber-access spectrum* (GSM/ CDMA, for example) for each *service*?

14. What quarterly/ annual spectrum charges would you suggest for Microwave access & backbone networks? What *criteria* should be adopted for this charging (e.g. per MHz, per KM, etc.)?

SUMMARY OF FINDINGS & RECOMMENDATIONS

Notes:

1. *The recommendations are based on the data that was available to the Committee. While care has been taken to ensure correctness, minor errors cannot be ruled out.*
2. *Some of the recommendations may necessitate consideration of the Department's extant policy and relevant statutes before they can be implemented.*
3. *In this report, the terms 'spectrum charges' or 'spectrum fees' generally refer to the total of the fees for possession of telegraph equipment and the charges for the 'usage rights' for the spectrum; and the 'per MHz' rate means the 'per MHz (paired)' rate, unless the context implies otherwise.*
4. *The Committee has not gone into the specific issue of 'fees for possession of telegraph equipment' to be levied from entities that are not required to seek a license for spectrum usage rights (whether directly, or through a transfer under a spectrum trading regime, if and when applicable).*
5. *The Committee has largely focused on commercially exploitable parts of spectrum, whether for public mobile telecommunications services or broadcasting.*

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1. *Considering* that radio spectrum is a limited natural resource that is "public property" and hence must be used in a manner that is most beneficial to society, *recognizing* that its use for different types of applications is to be guided by ITU and NFAP, *noting* that its presently exploitable portion is facing increasing demand as technologies and new uses continue to evolve, the Committee *concludes* that the societal benefit can only be maximized through a system that:

   - Duly recognizes the spectrum as a valuable economic resource that needs to be used efficiently and effectively so as to maximize public good,
   - Does not allow the '*ownership rights*' in this resource to be transferred to any user;
   - Optimally allocates it for use amongst competing demands, including for defense, security, disaster relief, etc. in an objective, equitable and transparent manner;
   - Ensures that the spectrum is *actually* used efficiently, effectively and harmoniously by all authorized users at all times;

2. Further, keeping in view the mandate of NTP-1999 that all users must pay for their use of the spectrum, the reality of exponentially increasing demand for RF spectrum, and the huge potential to improve existing *teledensity* levels, the optimal allocation mentioned above is likely to be best achieved by allowing the laws of market to have the maximum play. This alone would create an equilibrium between the present & anticipated demands for the *usage-rights* of, and the limited supply of, spectrum, with active participation by the intending users. More importantly, it is through this mechanism alone that the government can obtain, for all the owners of this public property, the best possible value in money terms that its use may fetch, and use it for

their overall benefit. It needs to be recognized that a majority of them may not ev availing of the services generated using the spectrum, but that can't disentitle th from claiming their share of the fair '*usage rents*' for the spectrum. The hue and c that is so often raised by the private service providers against the government trying to "raise revenues" totally misses this point. The Committee therefore strongly recommends that the Department move to usher in, at the earliest, the system to value and price all frequencies using the mechanism of transparently held *e-auctions*.

3. The Committee also recommends that the Department seriously consider ITU's suggestions regarding the retention of the "*right to reclaim the spectrum*" even before the expiry of a license, not only to meet its international obligations but to also effectively cater to *national* imperatives like tackling anti-competitive behavior and getting full value from private entities for the 'public good' called RF spectrum.

4. Keeping in view the fast-paced developments in telecommunication technologies, expanding demand for frequencies, and the mandate of NTP-1999, a regular review of spectrum pricing is a must. The Committee accordingly recommends a maximum term of 5-years for spectrum usage licenses in the usual 'commercial' frequency bands like 2G, 3G, BWA, and Microwave (Access). For other bands, licenses may continue to be given for a term of one year at a time.

5. The Committee notes that the *initial* CMTS licenses of 1994-95, that were for *GSM* technology, had a term of 10 years. As of now, all private operators have entered into *binding contracts* (UASL Agreements) with the Department, and these are expressly *technology neutral*. Hence it recommends that the *auction-based pricing* of RF spectrum be kept completely technology-neutral on the 'supply side'.

6. Other recommendations of the Committee are summarized as under.

   a. The Committee suggests that the *auction process* be so designed that there is an *in-built check* on its leading to extreme results. This includes the imposition, even if on technical grounds, of an *upper limit* to the entitlement of any operator participating in the process of auction, to frequency spectrum in MHz. This will ensure that the Government retains control over the *total* amount of spectrum that gets into the hands of any individual operator and also has the freedom to review the *upper limit* from time to time, as justified. *Monopolization* of spectrum, whether with an intention to obtain an undue competitive advantage, or to make undue profits by *hoarding*, would both be checked this way. The terms and conditions of spectrum *licenses* and of *auctions* need to be formulated accordingly, and transparently communicated to all stakeholders.

   b. In the interest of efficient *actual* use of spectrum, the Department would need to impose certain regulatory conditions rather than rely entirely on the *auction* route to provide all solutions. For example, while it is accepted that only *serious players* should participate in the allocation process, the problem arises when we try to define a "serious player". Should the Department go into the plans prepared by the operators and judge whether or not these show them as serious

players? Or should the seriousness be left to be assured by an appropriate amount of *earnest money* payable by those intended to participate in auction? Should spectrum be 'reserved' for some categories of applicants? Should some *intermediate entitlement criteria*, other than the ceiling on spectrum holding, be also imposed? These shall have to be studied in detail by the auction designer.

c. As suggested in Chapter 4, the 'lots' of RF bands proposed to be auctioned may also be classified according to the *degree of congestion* measured in an objective manner (traffic, spectral usage levels, etc.) so as to determine the most appropriate reserve prices and applicants' eligibility criteria.

d. To take care of the situation in which an existing service provider requires 'additional' spectrum well after an auction was conducted, the *inter-auction period* may be reduced to one year, while keeping the license period at five (5) years. Since the auction process is expected to be *online*, the main concern that needs to be addressed is to ensure adequate number of bidders for each auction. The WPC Wing of DOT will have to factor in various considerations before deciding on the auction schedule.

e. The report of the Group of Ministers of 2003 had suggested that incentives and disincentives be deployed to maximize efficient use of spectrum. This Committee has recommended some measures in this regard in Section 4.3.10.

f. While designing the auction process the Department needs to address the genuine concern of a service provider who enters the telecommunication business with a certain long-term horizon. It should be able to assure, to a reasonable extent, availability of spectrum at least within the prescribed ceiling, as and when the operator needs it. *While the present policy of unlimited number of operators per Service Area may be theoretically fine, it does not seem to be in consonance with the fact that the maximum amount of spectrum in a particular frequency band is fixed and cannot be increased by any means.* For example, the total amount of GSM spectrum (900/1800 MHz taken together) is only 100 MHz anywhere in India, and even if all of it *were* available for allotment in a particular Service Area, and even if the upper limit of spectrum per operator were fixed at 10 MHz *to facilitate better network planning*, not more than 10 fully operational operators can coexist on a continuing basis. In any case, those participating in an auction have to be told upfront the various conditions and circumstances most transparently.

g. The Committee considers it desirable to adopt established practices without introducing changes that undermine their *philosophical foundations*, so as to retain their efficacy. For example, *auctioning* is an internationally accepted model for spectrum allocation-cum-valuation, and eligibility criteria are an acceptable restriction, but *simplicity, free flow of information and unhindered use of the market forces of demand and supply* are the underpinnings of the approach, and must be respected. Otherwise, distortions will creep in, some participants will exploit privileged information they are privy to, others will deploy other means to overcome hurdles, and the government may not get the maximum value that the auction model should have ideally generated.

h. The Committee recommends that in the proposed *auction* regime, classification

of spectrum users *for the purpose of levying different prices* may not be resorted to; and in case the Government desires to give concessions in spectrum prices to any category of users on social, economic or security-related grounds, this may be done through suitably tailored *subsidies* that are *separately* made available to them in an equitable and transparent manner. The subsidies could emanate from concerned Departments of the Central or State governments.

i. As to the question of *pricing* spectrum when the auction model is inapplicable because of lack of demand, the Committee recommends the following approaches to be adopted:

1. Where the RF Spectrum is one that is earmarked for public communication applications, the applicant may pay the spectrum charges using a *per MHz* rate *deduced* from *'the annual spectrum charges paid or payable by RF users in the most comparable combination of RF band and geographical area'*. One way of doing it would be to revisit the relevant 'formulas' that were/ are being used by WPC and reset their parameters, whether for the existing categories of Service Areas or globally for the country so that the results yielded by them are a fair approximation of the relevant 'per MHz' rates found by auctions elsewhere.
2. Where the spectrum is one that is *not* earmarked for public communication (or commercial) applications, the applicants for the spectrum shall have to be necessarily charged some such *per MHz* rate as is considered reasonable having regard to the level of spectrum prices in nearby bands, the nature of application, and amount of spectrum.
3. If a particular frequency band is in demand for more than one radio service (e.g. *satellite services* and *mobile communication services* in the bands 2.5-2.69 GHz and 3.4-3.6 GHz), and the demand for spectrum for one of these services is less than the available spectrum, then *e-auction* could be resorted to for the *other* radio service(s) and the *pro-rata* bid amount apportioned to users of the low-demand radio service, but after taking into account the geographical coverage of such usage, subject to certain safeguards and also for a limited period of time.
4. In case the government decides to *subsidize* the cost of spectrum for any category of applicants, in the interest of transparency it may be done *separately* and without affecting the determination of the spectrum charges on above lines.
5. In all cases where the spectrum prices are not decided through auction, the spectrum *licenses* may be granted for five years at a time, but the prices be made subject to revision every year at the rates then in force.
6. In parallel, the Department may set up a system to ensure that all such rates are actually reviewed every year.

j. If a particular frequency band is allotted under NFAP for more than one radio service and it is not feasible to have auctions for one of them (e.g. on account of inadequate demand), then the auction could be carried out for any one of the other radio services in that band if that is feasible, and the *pro-rata* bid amount apportioned to users of the first radio service, taking into account the geographical coverage of such usage subject to certain safeguards and also for a limited period of time and with a cap on the maximum spectrum that an

operator may be granted.

k. Since the benefits in terms of *pricing* and *efficiency* that are achievable from the auction model may be severely curtailed and competition hampered *unless* the available spectrum's classification on '*frequency-cum-services*' basis conforms to ITU guidelines, the Committee suggests that operators meeting this classification, irrespective of the nature of their service licenses, may be allowed to bid for the concerned *spectrum bands*. This may necessitate a relook at existing license terms. An *Empowered Inter Departmental Group may also be created* as suggested in section 4.3.7 for the various satellite frequencies.

l. Till the *satellite frequencies* (being used for commercial applications including DTH-TV) are valued and priced through *e-auctions*, the existing rate structure needs to be urgently revised to bring in *at least some measure of parity in the charges* being levied for the different commercial/public uses of these bands.

m. The Committee considers the idea of *spectrum trading* worth serious consideration, especially since it would allow flexible exploitation of the valuable resource in numerous pockets of this large country, using the built-in incentive of earnings, and therefore recommends that *trading of the right to use spectrum within the boundaries of the terms of spectrum license including its duration* be introduced in a few carefully selected segments as an experimental measure to gain valuable experience before deciding on its spread to more areas over time.

n. The Committee recommends that the differential prices of spectrum in different categories[1] of geographical areas may be discovered through the market mechanism involving *separate but simultaneous e-auctions*. It also considers it eminently desirable, in the interest of faster development of telecom services in rural areas, to allow *niche operators* in Category 'Z' areas with concessions in Entry Fee, License Fee, Spectrum Charges, and benefits from USOF. This suggestion is considered feasible since the NTP-1999 already allows *multiple operators* in any Service Area, the existing UAS Licenses do not provide for any rollout obligations for rural areas at all, and the availability of radio frequencies in rural areas is also not expected to pose any problem. The existing classification of Service Areas, made around 1994-95, also needs to be revisited.

o. On the question of the Department of Defense (DOD) continuing to occupy the frequency bands that are required to be released to meet the public communications needs, the Committee recommends that the DOD be charged for the use of 2G and other spectrum '*earmarked for commercial applications*' at '*per MHz*' rates equivalent to what the public communication Service Providers pay, with effect from 1.4.2008, so as to transparently reflect in Government accounts the *opportunity cost* – of 2G spectrum being used by Defense – to the public exchequer.

p. Considering its possible impact on spectrum valuation, the Committee also examined whether, when an existing operator holding 4.4 MHz of spectrum

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[1] These are recommended as follows: X: *Existing Service Areas* (Metro, or other Service Areas), Y: *Notified cities & towns* (Within 'X'), Z: *Remaining Areas* (Other than 'Y', but within 'X').

participates in the auction, he should be allowed to bid for, and possibly even obtain, an allotment of spectrum right up to the extent of 5.6 MHz, taking his total holding to say an *assumed* upper limit of 10 MHz. Its considered view is that this would not be in tune with the objective of maximization of usage of spectrum. It may also deprive a more worthy applicant of immediate access to even a limited portion of the spectrum merely because there would be no spectrum left for him by the time the next round of auction commences. The Committee therefore suggests that the allotment of *additional spectrum* to any operator should be in incremental (small but viable) chunks of frequency bands that are calculated to meet the requirements of any operator over the next one to two years.

q. In the *first auction to be held,* all existing operators – whether they hold less than, equal to or more spectrum than the prescribed upper limit of spectrum, e.g., 10 MHz in 2G band – shall have to mandatorily participate so that they are able to help decide the *per MHz rate* at which they have to pay for the spectrum which they hold and/ or which decide to retain (subject of course to the prescribed 'ceiling' level), etc., whereafter all the operators, old or new, will have been brought to the *new pricing regime* at par.

r. As to the time when the *first auction* should be held to bring all the players to a single 'level playing field', it should ideally be as early as possible. This is particularly so when many applicants are already waiting in queue for the main/ spectrum licenses including some existing players.

s. The Committee notes that in the absence of an appropriately detailed legal structure, the WPC Wing of DOT has relied more and more on the mechanism of administrative decisions and orders to manage spectrum. The Committee therefore recommends that the legal basis for the assignment, monitoring, valuation, pricing, 'relocation' and withdrawal of RF spectrum be comprehensively set out in an appropriate 'Spectrum Act' that:

1. contains definitions of the latest terms;
2. lays down the powers, privileges, functions and duties of the Department, the Wireless Advisor and others involved in regulation and monitoring of spectrum; defines procedures, offences and penalties in contemporary as well as futuristic contexts;
3. specifies the organizational structure for ensuring the most objective, transparent and professional regulation of RF spectrum that this large country needs.

t. The 'Act' should also support forward-looking arrangements and structures to facilitate the development of an accurate and *up-to-date* information base[2] of technical, commercial and financial matters and result-oriented research *including* for valuation and pricing of the spectrum; to provide flexibility for introduction of incentives & disincentives for efficient and effective use of RF; and to create a 'Spectrum Relocation Fund' to facilitate, speed up or even force vacation of identified Radio Frequencies by existing users and their re-allocation

[2] At present there is hardly any such database, and this deficiency acts as a serious constraint in proper analysis of existing and expected situations in the light of international practices and regulations so necessary for proper planning and policy-formulation in the complex field of spectrum management and monitoring.

to others in public interest. The 'Act' should be accompanied by detailed rules framed under it to replace the present mix of notifications and orders.

u. Today, radio spectrum means many things to many: money to service providers, services to customers, a vital resource for national security, a major contributor to GDP, creator of jobs, facilitator of public utility services, banking, etc. The WPC Wing of DOT, being the sole agency in the country responsible for coordination and management of the invaluable spectrum, needs to be strengthened at the earliest. In fact, this was recommended earlier also by the Spectrum Management Committee (in their December 1998 report) under the *Group on Telecommunications* set up by the Prime Minister's Council.

v. Regulatory measures like the monitoring of spectrum usage from time to time, insistence on performance as per mandated rollout obligations, and the Government retaining a privilege to withdraw spectrum from an erring operator need to be put in place in a transparent and objective manner to ensure minimum play of undesirable practices that may frustrate the goal of ensuring the most effective and efficient use of scarce spectrum. Equally important, these should be made known to the applicants too in advance. (Recommendations of TRAI of Sept. 2006 pertinent to the subject are given in *Annexure-XXIII.*)

w. Till the proposed auction methodology is implemented within a firm timeframe, the spectrum charges may be levied from Access Services licensees under UASL regime at a flat rate of 8% of AGR up to 5 MHz of subscriber Access spectrum, irrespective of the type of technology deployed and the quantum of spectrum held. For any additional spectrum they may be charged extra @ 1% of AGR per MHz (*pro rata*).

x. For the purpose of *spectrum charges,* the AGR may be arrived at after imposing a ceiling of 20% on the 'eligible deductions' presently being claimed by the *access* Service Providers as per terms of the underlying *service license.*

y. The amount payable by an operator for any financial year may also be subject to a *floor-level* per MHz of 'main' and 'M/W access' spectrum held on the last day of each financial year for each Service Area. In case the spectrum charges are payable for a period less than one year, the amount of 'floor' may be computed *pro-rata.* The exact amount may be worked out by the Department using the trend of actual receipts during 2005-06 and 2006-07.

z. The Committee also stresses the need for the Government to play a more active role in the ITU forum in so far as the economic aspects of spectrum management, including its *valuation* and *pricing,* are concerned, since it's the Government that should be primarily concerned with its correct valuation as a public resource.

Finally, the Committee would like to mention that the Department of Telecommunications (DOT) had issued orders, within the framework of NTP-1999, to levy spectrum charges (license fee & royalty) from all Central Government Ministries, Departments and organizations, with effect from 1st June 2004. It understands that while most such users have started paying the said charges to WPC, the Ministry of

Defense (MOD) and the Department of Space (DOS) have not. Together they owe thousands of crores of rupees to the Department already.

The Committee notes that the Department has not been denied only the above-mentioned amount. It is also unable to get *additional revenues* running into thousands of crores of rupees that it can fetch through the pricing mechanism proposed by the Committee, *iff* the MOD and DOS vacate the radio spectrum earmarked for public telecommunication services.

Early vacation of the said spectrum is also crucial for improving the spread as well as the quality of public telecommunications in the country. The demand for spectrum in commercially-useful RF bands is rapidly increasing and it is in the interest of the public as well as national economy that the MOD and the DOS be enabled and persuaded to vacate the spectrum (by relocation).

The Committee therefore recommends that vigorous efforts be made both to realize the pending dues from the concerned Government Departments and to have the relevant parts of the RF spectrum vacated at the earliest for use by the public telecommunications sector.

Mishra Committee related documents

Preface

Any resource natural or otherwise has time value and opportunity cost attached to it. That time value depends on the use to which the resource can be put to, in order to bring in socio economic changes. These socio economic changes are only possible if the resource is exploited properly and cost effectively, which leads us to the **question of the evolution and application of technology to create volumes to bring in economies of scale.**

Let us for a minute look at the natural resources like Crude, Gas, Coal, Iron ore and most recently Electromagnetic Waves called Spectrum. All of them have played a very significant role in the socio economic development of the world in one way or the other, because all these resources became the victims of volume. The last of the resource to enter that field has been Spectrum, which even a decade back was not considered that precious, but to day in India itself the use of spectrum has created a section of industry capitalised at US$ 300 billion repeat 300 billion. Spectrum has provided connectivity. Connectivity has become a commodity for all sections of the strata; connectivity provides access to a plumber, politician, producer of agriculture and horticulture produce, professor and a promoter; alike to connect to consumers, students and constituents; end users as they say.

It is with this backdrop the paper on economic valuation of spectrum is timely and most welcome. It is time that spectrum is priced properly. **We must not continue to live in a time warp to say that what was valid in the 70s, 80s, 90s, in 1995 was valid in 2001, or in 2003 and is valid today.** If it were valid today, how does one explain those astronomical valuations totalling to US$ 300 billion built around 50 MHz of spectrum bought at some US$ 2 Billion; defies logic. **True value of spectrum is more of an economic issue than that of Technology.**

No wonder, industry is crying hoarse at the prospect of paying the market value, opposing tooth and nail to any changes in the pricing and milestones of allocation of spectrum from that followed in 2001. Economy, Opportunity and technology defy that approach. The price of US$ 400 million paid then, for a pan Indian license for 4.4/6.2 MHz of spectrum, can not be the same taking into account time value of money, inflation, evolution of technology, commoditisation of connectivity providing economies of scale, the maturity industry has reached and thus the opportunity it has created over a short span of 6 years. **A simple thumb rule suggests at least doubling of that value of spectrum if not more.** Well industry always wants everything free should they have their say or way.

Having set the scene, I would like to discuss the issues, concerns and some out of box suggestions to find **the time and economic** value of the spectrum driven by the consumer needs, expectations, evolution of technology its applications and yet unfathomed opportunity in the Indian market place.

The Issues

The questions of spectrum valuations and pricing arise from two or three fundamental issues. They are:

1. Market Dynamics or Forces or Opportunity,
2. Evolution of Technology and its applications
3. Finiteness of the Resource or Raw Material; Spectrum- how do you manage and plan for efficient use and timely availability?

The two (1 and 3) are in conflict. Number two is natural. How to resolve that conflict? Should that be by artificial methods or by scientific methods, in order to mitigate the problem of finiteness? Artificial method is capping or can even be called the cinema hall ticket line where in, those in front get the tickets and then sell in black or a lottery or a beauty parade to pick say four or five or ten and allocate the spectrum at some again artificial fixed price; once again the winners would do what they are best at doing; sell in black. The result of that is there to see where on an average 8 to 10 MHz spectrum is today valued at 25 to 35 billion US dollars. Who is the winner, not the government, but those who were ahead in Queue to grab the spectrum; **of course, not to undermine the entrepreneurial spirit of the risk takers' sweat and toil as well?** Therefore, it is abundantly clear that the issue of deciding the number of operators in each service area be left to the market forces?

How can that be done? Well invite applications from all those who are interested in participating and be part of the growth story of India's telecomm sector and immense opportunity that growth offers. Make the rules of the game abundantly clear on the amount of spectrum, a fair idea of **the minimum** amount of spectrum which each successful bidder would get as per internationally accepted guidelines, which more or less fixes the number of winners and call for bids and auction, may be, not by way of open auction but by an ascending auction, where in each round of bidding sets a new bench mark and ultimately the number of predetermined winners will be picked on the basis of the highest bid.

The word **minimum** spectrum has a connotation to get as many players in as possible to begin with to create competition. In addition, the number of players can get reduced, should the government not manage and plan for the availability of adequate spectrum in a proper way. **Any laxness by the government would only harm the government's interest by not being able to get the true value of the limited resource.** There is bound to be a shake up after the initial euphoria, but why should the government be seen to be a party to creating scarcity, when none exists. The market forces, in any case, would decide who all survives. **The minimum number of survivors must be capped at four to prevent possible cartelisation, for all times for all the shake ups in the industry.**

Therefore, there can neither be an arbitrarily enforced cap on number of players nor an open ended-ness in the number of players, because capping is against the tenants of free market access and open ended-ness is against the finiteness of the availability of raw material called SPECTRUM. **The process of artificially limiting players would only result in the winners selling the precious raw material spectrum in black.** The only way a fair value both in terms of number

of players and the **fair true economic value** of precious resource spectrum that can be achieved is by **AUCTIONing the spectrum.**

The consumer has benefited and will benefit by unlimited competition, but the owner of this limited resource has not so far benefited, because of its own flawed policies. **He must also be part of the success story without being greedy and by redefining the rules of the game astutely.**

Concerns over Auction

The very name of the Auction conjures obscenity and greed, **but is like pot (Industry) calling the kettle (Government) black or 50 paces laughing at 100 paces.** The auction route takes us to the concern or concerns that there could be mindless bidding and the bidders may put in some astronomical bids, which are not sustainable. The industry loves to quote the UK, Germany experience etc, which happened some 10 years ago. We have come a long way since then. The industry is infinitely mature. They would hardly be making any senseless bidding for this resource. They realise the potential of the resource as is manifest from the recent auctions in US and elsewhere. **In US re-farming in the 1.7 GHz and 2.1 GHz bands has resulted in the US government getting some 13.9 billion US$ in 2006, for 1000 plus licenses. They expect to raise another US$ 10 billion in the re-farming of 700 MHZ spectrum early next year. There is no hue and cry.**

Closer home bidding of another sort took place recently, when Vodafone bid for Hutch-Essar some US$ 22 billion, Maxis for Aircel some US$10 billion. The question is what for, spectrum of around 9 MHz for 16 circle licenses and 9 MHz for some 10 circle? Two questions arise, First has the consumer suffered; NO? **Second, who is the beneficiary of this astronomical numbers, Hutch from Vodafone, Aircel from Maxis and not the owner of the raw material the Government of India, which got a pittance in the 2001 auctions (some US$ 400 million), and yet continues to dole away licenses at those prices? On the contrary, Vodafone claims that Turkey and India are their best acquisitions; and Maxis claims India contributing significantly to their global consolidated bottom lines.**

Therefore, establishing beyond doubt that consumer has not suffered, the owner of the resource has; by not reaping the real benefits of the pricing of spectrum. The money has changed hands between the two private parties without a paisa coming to the owner; Government of India.

The consumer will suffer is baseless, misplaced theory of detractors who do not wish to pay for the resource and hoard spectrum by being there willy-nilly. On the contrary the consumer will benefit by increase in competition and bouquet of services. In addition, confirming that an auction and auction alone will establish the true value of the spectrum, as in US and elsewhere. **What is required is transparency in the rules of the game of auction.**

We can not be living in a time warp to use the 2001 auction as the bench mark and standard for all times. The government must not accede to the breast beating

of the industry to continue to ask for allocation on the 2001 criterion and auction price. The world has moved; utility of this resource has been established adequately and beyond doubt as is manifest from the sky high valuations of the companies providing services using spectrum they obtained so cheaply, opportunity has increased, technology has evolved and volumes have brought down the cost of equipment. It is time that the government, by going the auction route, establishes the economic, demand driven, market value of this precarious resource spectrum that it possesses. **Let them not be scared by the wolf cry of the industry.**

Some Out of Box Suggestions

The scarcity of this resource can always be mitigated by some out of the box thinking both for rural penetration, increasing competition and offering opportunity to those who may have missed the boat in the auctions. The steps for consideration are;

1. Mobile Virtual Network Operators concept, they will cerate a niche for themselves by targeting specific subsets of customers by customising services.
2. Inter and Intra network Roaming to be made compulsory. The biggest help can come from BSNL, which does not allow any body to roam on their network and vice-versa; **with their reach and penetration, every one gains.**
3. Providing tech neutral connectivity by creating points of presence by way of any means of transportation technology e.g. Fibre, Satellite, Microwave, UHF etc. The government focus should be and must be to take upon them-selves to be the facilitator and provider of backhaul transportation. **The proceeds of re-farming and USOF can be used for this purpose, and**
4. Let the task of Access provision be left to those who bag the access spectrum for 2G, 3G, 4G or whatever G.
5. **Allow infrastructure sharing, both active and passive**

For the Government

On mitigating the spectrum issue, the government should:

a) Get the spectrum released from other users where it is not at all optimally utilised, having hoarded the resource as a largesse or dowry for historical reasons, as is expected for such a scarce and finite natural resource. Let the users be compensated by use of a percentage of proceeds of re-farming to deploy newer and more efficient technologies.

b) Look at the spectrum crunch, which is being felt only in few metros and near metro towns (say up to 12), this pretext of spectrum limitation for inhibiting fresh applicants to rollout services in the rest of country wide network must not be allowed to stand in the way and be encouraged for those willing to take up the challenge in backward areas. **As is well known some 70% of geographical and 50 % of population is yet to**

be carpeted. Offer the opportunity to those willing to address those areas. This action will alert those sitting with spectrum, **but not doing anything out side of creamy layers.**

c) Not look at capping or not capping, however let the government First, establish the true value of spectrum, Second, its availability as per international standards and finally let the markets do the talking to decide the cap on the number of players.

d) Let the Government expand time, resources and energy in managing and in planning for the availability of the spectrum unlike hitherto. The fire fighting approach and a laissez faire attitude is most retrograde, is reflective of non-seriousness on the part of the government and brings in the uncertainty factors, thereby possibly diminishing the price of the resource.

Reiterating at the risk of even repetition, rather than regulating opening /capping access providers adopting flip/flop approach (which only serve the vested interests), government should look at forward looking innovating afore mentioned solutions such as permitting concept of allowing MVNO's and / or mandating intra circle roaming / intra network call forwarding etc etc.

For example, let the government release spectrum where there is no shortage of spectrum and tele-density is abysmal, but provide support for back haul and other infrastructure. Let there be no technology constraints for creating Points of presence. **Once this is done, all these so called rural customers; will become the growth drivers for the city networks because of the connectivity and community of interest.**

In nutshell, let the market forces decide, but put no constraint on technology or any other artificial barriers. The government must make it mandatory for inter-circle roaming of all networks; and intra-circle roaming should be need based by agreement of the operators.

Summing up, the present policy of not restricting the new applicants but leaving it to market forces, though implemented in Nov 2003 for all the wrong reasons, is having a very salutary effect on

a) rate of expansion of services (6-7 million additions every month)
b) lowering of tariffs (2cents/min or less than Re 1/ min)
c) enough innovation in the VAS services,
d) maintaining reasonable level of QOS despite constraints in Spectrum availability and timely provision of interconnects.
e) Most importantly has created an industry valued at US$ 300 billion

Therefore, unrestricted number of players must be allowed to compete for the finite resource to establish the true economic value of this precious natural resource. **The spectrum in all bands including 800, 900 and 1800 MHz bands must either be auctioned to anyone who is in the queue after 2003** or only

assign spectrum after applying time value of money and inflation index to the 2001 pricing for the 2 G spectrum to any one who is in the queue after having paid the license fee, and is awaiting spectrum. **In any case, heretofore, auction all spectrum for 3G, 2G or any other G, without any linkage to the present UASL license holders.** The subscriber linked criterion is grossly flawed, has outlived its utility and is subject to abuse. Such an approach of subscriber linked criterion will not attract the true economic value of the spectrum for the government as has been demonstrated because of the assuredness of the spectrum in the scheme of things, but would only benefit the industry to make money as has been demonstrated by recent valuations. **Let the call be taken by the government on the type of auction; open or ascending.**

Since, the availability of spectrum depends upon the success of re-farming exercises undertaken by the government, therefore, the quantum of spectrum to be auctioned and number of operators will be decided by the spectrum available by Govt at that point in time. Notwithstanding, the value of the spectrum is very much linked to the timing of auction, quantum of spectrum, cost of the technological implementation to exploit it, and the number of service providers, including their business urgency; it is desirable that the government must take a proactive stance to release as much spectrum as possible and required to fulfil immediate needs with an assurance that more would be available as and when business demands. They must make it very clear to the bidders on what and how much is being sold; and what they are entitled to in the long run as per the present auction. **Let that be very very unambiguous.**

In addition, and as alluded to earlier, the government needs to and must address the issue of number of possible spectrum based access providers keeping in view the availability of spectrum, a finite resource. A fresh look on need and timing may have to be made, reviewed periodically depending upon technological evolution and demand. The Government authority may wish to consider different caps for Rural, Semi-urban and Urban areas. Let market forces take over from there.

Concluding

The approach could be the following:

1. **Assign equal spectrum to all operational licenses awarded up to 2003, which could be either as per new criterion recommended by TRAI or any other criterion decided by the Government, e.g. maximum of 10 MHz for metros.**

2. **Assign minimum spectrum of 4.4 MHz to all those who have paid license fee as per 2001 bench mark, but suggest adjust the 2001 price to the date of award of licenses by applying time value of money (PLR + 5%) and inflation index. We can not apply 2001 yardstick in 2007 or so in perpetuity.**

3. **All the speculators in the queue, who are just there for the gold rush or those not in the queue because of uncertainties or lack of clarity of**

the policy should be asked to participate in the auction for 2 G, 3G or any other spectrum auction. The mode of bidding whether open or ascending can be decided by the government.

4. There must not be any linkage whatsoever for the future auctions of the spectrum for 2G, 3G or any other G service with the present operational or any license. Bidding for the spectrum for any G service must be open to all.

5. The auction must be truly open for any one to participate in the auction of spectrum for any G. However, suggest that he or she must have, preferably, obtained a plain vanilla UASL license by paying the prevalent license fee (some Rupees 80 Crore, as per 28th August recommendations) in order to reflect his or her seriousness. Such an action segregates the licenses from spectrum for any G service. Such a plain vanilla license holder can bid for any spectrum as and when offered by the government. Such a license holder, in any case, can continue to offer any service or services which do not require a spectrum or by using unlicensed bands.

The responses to the Questionnaire are based on these Hypotheses.

Questionnaire

1. ***How best should radio frequency (RF) spectrum be valued, considering that its value depends on numerous variables like the spectrum bands involved, technology deployed, investments required and made, types of services offered and demanded, level of companies, etc?***

The spectrum economic value can only be established in a scientific way by auctioning the spectrum, bringing in technological neutrality, or it could be a hybrid approach such as beauty contest etc. The auction could be open or ascending. The economic value of spectrum is manifest from the valuation of some of the existing operators each valued at some 15 to 40 billion US$ and the most recent auctions in the US where 13.9 Billion US$ have been raised by auctioning the spectrum for some 1000 plus licenses.

The government must not continue to use the 2001 valuation in 2007. The reason that there is a beeline and frenzy of spectrum seekers is because of pious hope and strong belief that the government can be hood winked in the name of the sufferings of the consumers to get a PAN India license for US$ 400 million with an attendant and assured spectrum of 4.4/6.2 MHz for 2 G services to begin with, qualifying for additional spectrum on subscriber linked basis and be the first in queue for the 3 G spectrum.

True value of the spectrum also depends on;

Level of competition, which can be generated by the urgency of the need,

Cost of technologies at that point in time, for maximal exploitation,

Opportunity cost, which is bench-marking with the relative cost of using alternate technologies.

The proceeds, it is strongly believed, could be used for re-farming of the spectrum. **The process can create a virtuous circle, of transparency and establishing true economic value of this vital resource.**

2. ***Should the pricing of spectrum be based on its valuation? Why, or why not?***

Of course, the pricing of the spectrum has to be based on its valuation as determined by the market forces. Of course, the owner of this vital resource must get the fair economic value of its asset. Do not we sell licenses for Gas, Oil blocks, coal, iron ore etc? It is for the entrepreneur to judge the value of the raw material on his research of market forces to determine the consumer expectations of service he wants and what he would pay for the service? There is no other way in today's market driven economy, except a scientific approach to establish the economic value of the resource. It is the entrepreneur, investment banker and consumer who have to decide, not by any artificial means of first in the queue. However, pricing should also cover the cost of administering the spectrum; and should take into account the value of the best alternative if applicable.

3. ***As the value of spectrum would change from time to time, what mechanism would you suggest should be adopted to ensure that it gets properly reflected in the pricing of the scarce RF spectrum resource?***

First get a fix on initial spectrum valuation, second have an ascending revenue share mechanism where success is shared reasonably and equitably and finally set bench marks for assuring with the service provider a minimum rate of return on his investments. I remember Oftel not allowing tariffs to go up beyond a certain percentage of inflation in order to curb profiteering by service providers unduly. This is one way, but there are many ways in which a win-win-win situation could be arrived at. Some of the approaches could be:

a. Pricing can be 2 tiered, one fixed component—upfront payment, linked with annual payments based on revenue share. Both figures can be transparently increased. Fixed component –by interest element like PLR plus 5%, annual percentage payments can be linked to inflation index

b. Allocation criteria, and manner of payment calculations can be decided and announced in advance, and

c. Let there be built in incentives for efficient use of spectrum and deterrents against hoarding, **higher revenue share charges for more spectrum to arrive at a balance between Capex and revenue share.**

4. ***How best should the spectrum be priced? Should it be based on formulae, revenue-sharing, auction, on a combination of two or more of these approaches? Please justify your response.***

Auction is best, but use of formulae to cross check could be resorted to. For example if on average 9 MHz can command valuation of say 35 billion US$ to day; by using some discounting a reasonable fix on price expectation can be arrived at. In addition, revenue share must be there to share success and failure of the parties. The share of revenue should increase with the additional revenue in order to incentivise the service provider not to hoard spectrum, resource and raw material. **The pricing could be a combination of auction and revenue share.**

5. ***In your considered opinion, do the existing RF spectrum charges-which are formula based or revenue share-, need to be modified to ensure the most effective use of the scarce RF spectrum?***
    a) ***If not, why?***
    b) ***If yes, please give your views in the matter, taking into account the need of arriving at similar levels of charges through different methods?***

The present regime of spectrum charge is very seriously flawed whatever that be formulae and or revenue share. The new TRAI proposed recommendation of 28th August 2007 on artificially fixing some charge beyond a point is no help, because it bench marks to 2001 valuation. **Some charge beyond a level, there is no scientific or market value basis of that charge, especially when bench marked to 2001.**

The policy is flawed on two counts, first number of sub formula and second artificial price beyond a stage. The sub number is vastly abused, because of that spectrum obtained is most inefficiently utilised resulting in astronomical market Caps for the service provider and any artificial price set at 2001 levels is untenable.. **The owner of the resource is being short changed.**

Therefore, auction and ascending revenue share, the higher the spectrum, the higher the revenue share, as has been brought out in reply to question 2 and 3 above should be adopted. In addition let all bands, 800, 900 and 1800 MHz, be included in that auction.

However, after first meeting the initial requirements of spectrum of all operational licenses equitably and as per original license conditions, but reset according to new subscriber linked criterion or any other criterion set by the TRAI or Government.

Second, allot minimum spectrum to those 22 or so licenses that have paid the license fee, but after making adjustments to the 2001 prices.

Finally, auction all bands whether 2G or 3G or any G to all those speculators in the queue. All those in the queue must participate in the auction, since they are there as an after thought to cash on cheap availability of the spectrum.

6. ***Need and methodology for differential pricing of various parts of the RF spectrum (frequency bands), taking into account the level of demand***

(high, medium or low), so as to encourage the spectrum users to move away from highly congested parts of the spectrum?

In a way that exists even today; i.e. in the form of circle classification A, B and C. one could introduce a category R on set principles of defining R by way of economy of the place, tele-density, and connectivity in general per se and future potential, but all that is subjective. Let R be a subset of the three classifications and let the winner take into account his or her obligations to provide connectivity to the areas. Alternately, let there be an auction for just the R category by allocating spectrum for those areas. **There is no shortage of spectrum in 80% of India.** Let the winner sink or swim.

Another approach could be that in every licensing area, up to maximum allotted so far to an operator could be taken as bench mark, up to which request of others can be considered on subscriber linked criteria, and also charged accordingly, with an assurance that they cover category "R".

Beyond that floor level spectrum could be put to auction. Thus spectrum floor level will vary from area to area, bringing inter se level playing field, including rural areas.

7. ***How should the spectrum bands be classified so as to use pricing as a tool to decongest over demanded parts of spectrum?***

First, we must understand that the spectrum bands, their use and technology is decided as per ITU guidelines, which are adopted in the formulation of National frequency allocations plans (NFAP). Second the equipment manufactures too, follow these guidelines to manufacture equipment to keep standardisation, compatibility, the services the equipment can offer and replacements in mind. Therefore, there is no easy fix. Let the moving away form over demanded parts of spectrum be decided by the entrepreneur. The only way forward is to have inbuilt deterrents to load this precious resource e.g. higher share of revenue for higher allocation of spectrum. Leave that part to market forces and services providers to do that balancing act. **Auction all spectrum as in US.**

8. ***Should the assignment and pricing of spectrum be based on different criteria for metro, urban and rural areas of the country, taking into account the levels of current & potential usage (high, medium or low) and the need to encourage growth of spectrum-usage in rural areas?***
    a. ***If not, why?***
    b. ***If, yes, please suggest***
        i. ***The criteria for such assignments and pricing and***
        ii. ***The definitions of metro, urban and rural that should be used***

Let us accept that the present policy is indeed flawed. In any case there exists a classification of circles. Therefore either create circle R category or let the approach suggested in answer to question 5 and 6 above can be adopted. In any case a circle license gets spectrum for free for rural areas, where 70% of India resides, but is unwilling to invest monies. Therefore, invite bidders to serve rural

areas where spectrum is going a begging. Let the government be that catalytic agent to provide the back haul from these islands of obscurity.

9. ***To what extent should the following criteria affect pricing of spectrum?***
    a. ***Demand and supply situation?***
    b. ***Socio-economic benefits of the particular service(s) for which the spectrum is assigned / used?***
    c. ***Funds needed to release spectrum for commercial use (re-farming)?***
    d. ***Revenue needs of the government?***

If I were to decide the pecking order, it should be b, a, c and d. the socio economic benefits alone will create demand supply situation until it becomes that virtuous circle creating strong demand because of the socio economic growth. That achieved, one will have to get the spectrum released from other users who may have to invest in alternate technologies and media. That requires funding. This funding must come from the proceeds of the sale of spectrum for socio economic needs and the revenues generated by those services.

That accomplished the government gets its revenues in the form of direct and indirect taxations and levies. However, the re-farming must not be for the benefit of the government to balance their books by direct means, but by indirect means, except for the initial sale of the spectrum.

10. ***In your opinion, what strategies (pricing and other) are most likely to ensure the most effective use of the latest technologies so as to achieve efficient and effective use of spectrum in congested areas?***

The government must arm itself with enough data to be able to support its stand point from the point of view of inefficient use of the spectrum. These are fairly simple technical matters. Any equipment supplier would provide answers.
For example, the cost of BTSs for smaller cell size. After all, the congestion is in central business districts (CBDs) and that too for few hours in a day. No way must the government allow hoarding of spectrum, just to be used, for few hours of the day that too in the CBDs and use that as a pretext for the companies not to invest in efficient technology or technologies.

Let the spectrum charge increase with increase in spectrum allocation. Let that increase be steep enough for the companies to think and find a balance between higher spectrum charge vis-à-vis higher revenue share or invest in installing better efficient technologies to control higher revenue out flow by way of spectrum charge. Let them pay higher share of revenues for higher allocations. **Let the service providers decide and choose between Capex for efficient technologies and revenue share for inefficient use. Ultimately, it is money which business understands.**

The spectrum shortage is only in 12 cities and that too in the central business districts for 4 to 6 hours of a day. Let industry find solutions to strike a balance between Capex and revenue share.

11. What should be the determining criteria for initial assignment of spectrum, especially in those bands where it is (or is going to be) particularly scarce in relation to demand?

The minimum which is required for a building block e.g. say 5 MHz for WCDMA, because anything less than this is useless. Similarly 4.4/6.2 MHz for the 2 G must be assigned, but create an environment that they get the spectrum when they have arrived at a certain pre-determined and pre-agreed milestone. Make it unambiguous to the bidder that this auction guarantees you up to a **minimum** of the building block requirement of say 5 MHz (for WCDMA) and **an assured** additional 5 MHz or 10 MHz or 15 MHz etc for 3G as per these milestones and a minimum building block of 4.4/6.2 MHz for 2G. **He must know upfront what he is bidding for. Uncertainty and curiosity are No-No in the game of evolution, competition and evolution of technology.**

12. Should the present practice of assigning (on the basis of subscriber-base) "addition" spectrum to existing mobile operators (and also its pricing) continue? Give reasons to support your answer.

Subscriber linked criterion is most abused and flawed way of spectrum allocation. It was okay when the industry was in its infancy. Industry is mature; technology has evolved, therefore, immediately stop a grossly inefficiency ridden subscriber linked system of spectrum allocation. Let the revised criterion be used as recommended by TRAI recently, if accepted by the government and until more efficient and transparent criterion is established. The present practice may continue for initial requirements of 4.4/6.2 MHz for new assignees; however the cost figures should take into account the interest element and inflation index for the 2001 pricing.

It can not be at the 2001 bench mark in perpetuity even in 2007. The start spectrum cost must not be the same for 4.4/6.2 MHz, but properly equated to for 2007 economic conditions, only achievable by auction.

13. Would you like to suggest any quarterly /annual spectrum charges for subscriber-access spectrum (GSM/CDMA, for example) for each service?

Whatever one does, please de-link any relationship with subscribers. Let the charge be quarterly as hitherto for each service, in addition to any entry fee paid to get initial building block of the spectrum for the two services; 5 MHz for WCDMA and 4.4/6.2 for 2G

14. What quarterly / annual spectrum charges would you suggest for Microwave access & backbone networks? What criteria should be adopted for this charging (e.g. per MHz per KM etc)?

The present practice may continue, except that it could be benchmarked with the cost of best alternate technology, and if needed, it could be revised accordingly. Again let the principle of deterrent for hoarding and reward for efficient use is applied.

Annexure 2

PM Inaugurates India Telecom – 2007

December 12, 2007

"I am extremely happy to be here in your midst to inaugurate the India Telecom Conference. At the outset, I would like to acknowledge the phenomenal contribution of the telecom sector to the rapid growth of the Indian economy. The sector has shown remarkable enterprise and dynamism in the last one decade. May you grow even more rapidly in the coming decade

Three years ago, a target of 250 million telephone subscribers by 2007 was considered too ambitious. You have proved the critics wrong and have reached the milestone well in time. I congratulate the industry for this phenomenal expansion and growth. Today, as my colleague A.Raja mentioned around eight million new telephone subscribers are being added in India every month. This is mostly in the mobile telephone segment. Mobile telephony has been growing at an annual rate of over 90% since 2003. We need to understand what has spurred the remarkable growth of this sector and take steps to ensure its sustained continued growth in future as well.

The key to the growth of telecom has been liberalisation, reforms and competition. This has been as true of telecom as it has been for civil aviation, insurance and asset management. All these sectors have benefited enormously from the removal of state monopolies, reduction in entry barriers to new firms, creation of a level playing field between incumbents and new entrants, and most importantly, forward looking and even-handed regulation which has promoted competition and also effective consumer interests. All these are important steps whose lessons need to be kept in mind if we have to maintain the current growth momentum into the distant future.

The growth rate of the Indian economy is at a historic peak. It has averaged close to 9% year after year and we are now targeting a growth rate of 10% in the 11th five year plan. Given our youthful population and a rising savings rate, I am confident that we will be able to sustain this growth in the medium term. The major constraints I foresee are the availability of skilled manpower and of high quality infrastructure. The infrastructure needs of the country are in excess of 450 billion US dollars in the next five years and we need to work towards facilitating investment on such a large, massive scale.

Growth in the telecom sector is a critical component of our infrastructure plans and it plays an important catalytic role in our development process. The opening up of the telecom sector has created an impressive forward momentum in India, resulting in massive investments and expansion in supply which are signs of a vigorous, competitive and fast growing sector. I am very happy that the telecom department has ambitious targets for the future - 500 million telephone connections, 40 million Internet connections and 20 million broadband connections. Raising the investments needed for this ambitious plan would be a tremendous challenge for the industry as well as for the country.

I would like to draw your attention to a few issues concerning this booming sector. First, there is the issue of access and the large rural-urban divide in connectivity. Although the growth in the last few years has been truly impressive and our tariffs are among the lowest

in the world, vast stretches of our rural population have little or no telecom penetration. Rural tele-density is still in single digits. I had heard of plans for a Phone in Every Village some twenty years ago. We have not yet reached that goal. This is why we have emphasised telecom connectivity in our Bharat Nirman programme.

There will be multiple benefits from increased rural telecom connectivity. At a narrow level, there will be a new burst of growth for the sector as a whole. On a larger plane, however, there will be multiplier effects for the entire rural economy. As better telecom connectivity and consequently better IT connectivity - becomes a reality, our rural hinterland will become more integrated with the rapid growth processes now taking place in the rest of the economy. There will be increased economic opportunities for our rural people - through better education, through improved market access for their products, through improved employment prospects, and through greater purchasing power in their hands. The spin off benefits will be felt, not just in telecom, but right across the economy as a whole. Telecom connectivity has the potential to play a transformational role in our rural areas. I expect all key players in this vital sector to realise and fulfil this latent potential. You need to rise to the challenge by devising innovative mechanisms for achieving our collective ambitions.

Second, while we can be satisfied with the growth in tele-density, I am concerned about our capabilities in telecom R&D and manufacturing. Can we have a sector where we are world-class in telecom networks but do not have an adequate manufacturing presence. I am happy that an enabling R&D environment is now being created by setting up Telecom Centres of Excellence through a PPP mode in our premier institutions of higher learning. These will enhance talent pool for R&D, facilitate development of state-of-the-art technology and promote country specific innovation. I wish this initiative all success as this is extremely relevant for maintaining our presence in cutting edge technologies.

We, however, need to also create an ecosystem for the rapid growth of manufacturing for telecommunication products. We need to build on our well recognised capabilities in software and IT to establish a large scale presence in manufacturing as well. It is important both from an economic and a strategic point of view that we are present in the entire telecom value chain. I assure you that the Government will develop a forward looking policy regime that will encourage investment in manufacturing in this sector.

Lastly, I am concerned that we should have a policy regime which will enable the continued growth of the telecom sector for many many years to come. As I have said earlier, the key enabling factors for this sector have been liberalisation, reforms and competition. We must never forget these principles. I am aware that spectrum availability can be a constraint for the growth of this sector in future. On the supply side, our government has taken steps for vacation of spectrum by existing users. This is at an advanced stage and the requirement of making spectrum available for commercial uses is being addressed. I have asked the Group of Ministers tasked with this to expeditiously conclude its deliberations and suggest a roadmap regarding availability and timing.

At the same time, we must realise that we need to make use of this precious and limited resource in an optimal manner. All technological options must be explored to maximise its utilisation. The policy regime for making spectrum available should be fair, transparent, equitable and forward looking. It should not create entry barriers to newcomers or barriers to the continued growth of the important sector. At the same time, the revenue potential to the government must not be lost sight of. After all, governments across the globe have harnessed substantial revenues while allocating spectrum. In the final analysis, the key issues are correct pricing, fair allocation rules, and a pro-competitive stance. In the past, the department of telecommunication and the regulator have successfully enabled the rapid growth of this sector. I believe that working closely with the independent statutory

regulator, we can balance multiple objectives in a fair and reasonably manner.

I am very happy that India has successfully made the journey from being a country with high telecom tariffs to one in which tariffs are today the lowest. Healthy competition has ensured that the benefits of skill and technological advancement have been passed on to consumers, allowing the regulator and the Government to let a tariff regime of forbearance prevail. I would appeal to the industry to continue its healthy track record in this regard.

The telecom revolution is poised today to transform our economy and our polity. It has become a part of our day-to-day lives. It can be the vehicle for taking us into the knowledge economy of the future. Against this backdrop, India Telecom 2007 offers an ideal platform to provide a glimpse of the opportunities in our country. It will also afford service providers and manufacturers an opportunity of exposure to new and emerging technologies and solutions. I am confident that this event will serve to provide a fresh fillip to the growth of this pivotal sector.

I wish the organisers and participants all the best for the conference".

Spectrum Squatting-Cost to the Exchequer-A Study

Spectrum is a scarce national resource. A pan India Universal Access Services License (UASL) with a cost of around Rs 1648 crores, was a price discovered in 2001 through an ascending E-Auction in a fairly transparent manner. The UASL license provided for 4.4 MHz of bundled spectrum for 2 G services. Any allocation beyond this spectrum was allocated on the most abused subscriber Linked criterion and an arbitrary first come first served principal. The astute Indian licensee would devise ways to ramp up subscriber numbers and to be that first to stake claim for additional spectrum.

In India, up till now (2008), spectrum for wireless telephony continued to be bundled with UASL license at 2001 determined price point under an allegedly flawed spectrum allocation policy. In reality, apart from the flawed spectrum allocation policy, the 2001 price was way below the cost of the 2G spectrum which came bundled with it. Additional spectrum also continued to be granted on a subscriber linked criteria. The realisation of a flaw in the 2G spectrum allocation policy, probably started to dawn with the sale of Hutch to Vodafone at around $22 billion.

There was a scramble to get UAS licensees in 2007 seeing the valuations commanded by this deal. The line was lead by few Realtors and companies completely far removed from telecomm as their business. These realtors and speculators made a killing selling their stakes at multiples unheard of without commissioning any network and owning a single customer. Even today most of them have no customers to boast about. The subsequent stake sales in new telecom licensees Swan and Unitech at multiple valuations to the license fee paid by them appears to have fortified the realisation that our spectrum allocation policy was flawed and was leading to huge losses to the public exchequer and benefiting private pockets. These two new licensees had not even rolled out a network, making it obvious that the multiple valuation reached reflected the valuation of the spectrum held by these companies. In effect these new licensees, who have failed to rollout any networks, are spectrum squatters, hogging up precious spectrum for making an overnight killing at the expense of the public exchequer.

Whereas these companies are sitting on resources after making a killing by trading, there are companies who are starved of these resources making the consumer suffer because of poor service. In addition, the exchequer is deprived of about 20% of the revenues by way of License fees, spectrum charges, service tax etc. Therefore, the policy so far has been completely flawed on few counts:

Not getting a market determined price for the precious resource,

No recourse to any penalties for non-use of this resource and non-generation of revenues, and

Consumer continues to suffer.

With these massive losses caused due to the government doling out 2G spectrum, the issue seems to have become explosive in the public arena and it has virtually forced the government

to rewrite policy such that future spectrum allocation happens via open and transparent auctions, which can help achieve the market value of the spectrum to the benefit of the public exchequer.

Though the government may have decided to auction 3G spectrum and may be in the process of contemplating adopting the auction methodology of allocating additional 2G spectrum, spectrum squatting can still occur and its potential needs to be evaluated further such that the policy framework can be shaped in such a way as to prevent spectrum squatting. The following would illustrate how government is loosing out because of spectrum squatting.

Players that bid for 3G spectrum, can place high bids in such a way as to corner 3G spectrum, making it difficult for some of the existing operators to get 3G spectrum. These players can then sit out and wait for the existing operators to become desperate for 3G spectrum and then sell it to them at a premium. Given the current economic scenario, speculators can bid and then wait for the economic environment to improve and then resell the spectrum at a much higher valuation.

While, the present policy framework provides a revenue share fee for the government, based on the adjusted gross revenue (AGR) earned by an operator, this does not hold any meaning if a player chooses not to rollout services and it does not earn any revenue. However, if a functional operator had acquired the 3G spectrum, it would in all probability have deployed it and would be using it. In the process, it would have earned revenue share for the government as well. Thus, spectrum squatting can take place even, with auctioning of spectrum and lead to losses to the government exchequer by not generating sharable revenues. This is indeed the case in the 2G scenario, where all of these newcomers have precious little to generate revenues and share the fees with the government.

In this context, the potential 3G spectrum bidders can be divided into three categories with different implications:

1. Existing 2G operators – This category, on acquiring 3G spectrum will need to start paying 3% of AGR as license fee, up from the 2% they are paying at present, besides service tax, spectrum charge and USO contribution

2. New 2G licensees – This category, on acquiring 3G spectrum can choose not to rollout and not pay any license fee, service tax, spectrum charge and USO contribution

3. Pure play 3G operators – This category, on acquiring 3G spectrum can also choose not to rollout services and not pay any license fee, service tax, spectrum charge and USO contribution

Thus, it is apparent that players in category 2 and category 3 are potential candidates for spectrum squatting leading to losses to the government exchequer.

The following table reflects, the kind of fee that the government earns out of license fee/ revenue share and spectrum charges based on the AGR in the 2G space. Thus, spectrum squatting can lead to substantial losses to the public exchequer.

TABLE-1

Year	Approximated Jan to year end-No of mobile users	ARPU1	ARPU2	TR1	TR2	Govt revenue 1	Govt revenue 2	Per MHz revenue 1	Per MHz revenue 2
	mn	250/m annualised	350/m annualised	crores	crores	crores	crores	crores	crores
1997	0.339	3000	4200	102	142	20	28	0.34	0.47
1998	0.882	3000	4200	265	370	53	74	0.88	1.23
1999	1.2	3000	4200	360	504	72	101	1.20	1.68
2000	1.884	3000	4200	565	791	113	158	1.88	2.64
2001	3.577	3000	4200	1073	1502	215	300	3.58	5.01
2002	6.432	3000	4200	1930	2701	386	540	6.43	9.00
2003	12.998	3000	4200	3899	5459	780	1092	13.00	18.20
2004	33.701	3000	4200	10110	14154	2022	2831	33.70	47.18
2005	52.175	3000	4200	15653	21914	3131	4383	52.18	73.05
2006	129.54	3000	4200	38862	54407	7772	10881	129.54	181.36
2007	233.62	3000	4200	70086	98120	14017	19624	233.62	327.07
2008	346.29	3000	4200	103887	145442	20777	29088	346.29	484.81
March 2009	391.76	3000	4200	117528	164539	23506	32908	391.76	548.46

Data Source for no. of mobile users: DoT annual report and TRAI
*****Revenues in this chart have been approximated for the purpose of arriving at losses to the government due to spectrum squatting

The fee that the government earns from spectrum usage includes service tax of 10%, a blended revenue share of 7%, 2% blended spectrum charges and 1% contribution to the Universal Services Obligation Fund (USOF). Thus, spectrum squatting can potentially lead to a 20% of AGR loss to the public exchequer. For the purpose of computation, the total revenue has been projected on the assumption of approximately Rs 250 (ARPU1) and Rs 350 (ARPU2) as the blended average revenue per user (ARPU) and has been used as an approximation of AGR to calculate the approximate government revenues TR1 and TR2. The last column above indicates the per MHz revenue to government on the assumption that approximately 60 MHz of 2G pan India spectrum is in usage and has been calculated both for TR1 and TR2.

The calculations from the table clearly suggest that auctioned 3G/2G spectrum, if allowed to remain idle could lead to losses in government revenue. With the government allegedly planning to auction four 5 MHz 3G slots amounting to 20 MHz of spectrum, the potential revenue loss due to spectrum squatting can mount to nearly Rs 9000 crores per year given that the approximate government revenue in 2008 was between Rs 3462 million and Rs 4848 million per MHz as per the table above.

Thus, while a certain timeframe may be allowed to acquirers of 3G spectrum to commence services, a certain imputed license fee, spectrum charges and USO contribution should become chargeable beyond that point irrespective of the fact whether services have been rolled out or not. Announcement of such an upfront fee is likely to act as a deterrent for spectrum squatters to bid for spectrum.

It may be argued that the new 2G UAS licensees have been stipulated with a rollout obligation. However, it may be noted that the rollout obligation is miniscule in relation to the total revenue potential and the potential loss of revenue to the government. Thus, a player may choose to do a minimum rollout just to continue to hold the spectrum till a suitable buyer for the spectrum is found. It may also be noted that almost none of the new UAS licensees have rolled out any 2G network till now as apparent from the latest TRAI release on subscribers added in June and July 2009. This appears to be a clear example of spectrum squatting leading to huge losses to the government exchequer in terms of revenues to be earned out of license fee, spectrum charges, service tax and USO fund contribution. In the case of 3G it may be argued that a 3G winning bidder who pays a substantial amount for 3G spectrum would want to deploy the spectrum to start earning revenues. However, it is also likely that the 3G winning bidder may want to sit out in the wait for a capital gain and in the process lead to losses to the government. As demonstrated above, the total loss to government on 20 MHz 3G spectrum can mount to Rs 9000 crores. On a per player basis, this would amount to Rs 2250 crores.

In this respect some of the following deterrents can be built into the policy framework such that spectrum squatting does not lead to losses to the government:

1. Introduction of a spectrum trading charge such that sale of spectrum and its subsequent transfer results in a fee payable to the government

2. Closure of loop holes like issuance of fresh equity for fresh capital, which can be subsequently en-cashed by issuance of bonus shares and their sale

3. A clear re-write of the subjective and arbitrary rollout obligations, which are open to various interpretations by the operators

4. Introduction of a fee, which becomes due to the government, whether or not the 3G winning bidder deploys the spectrum or not. This fee should take into account the 20% revenue that the government earns from usage of spectrum

5. Apply the same yardstick to the 2 G spectrum holders to pay up for spectrum squatting.

While arriving at a methodology of calculation of a fee to prevent spectrum squatting, the government will need to bear in mind that the announcement of such a fee is likely to depress the upfront bid amounts as the bidding player is likely to factor in such payments into its business model. Too high a fee could depress bids substantially and too low a fee could encourage spectrum squatters. However, it is beyond doubt that a fee to prevent spectrum squatting is necessary and the government will need to establish a fee that does not impact the bid price substantially, but at the same time deters spectrum squatters. Also, this fee

needs to be announced before 3G auctions such that various bidders can include it in their business model and determine the bids they would like to place.

A second table as reproduced below to establish the per MHz revenue that is accruable to the government.

TABLE - 2

Year	Operator	Suscribers	Annualised ARPU	TR	Government revenue	Per MHz Revenue@7.5 MHz per operator
			INR	Crores	Crores	Crores
2006	Bharti	31974038	4305	13764	2753	367
2006	Hutch	15364211	4353	6688	1338	178
2006	Idea	14892114	3702	5513	1103	147
2007	Bharti	55162944	3767	20782	4156	554
2007	Vodafone	39864881	3636	14497	2899	387
2007	Idea	24854660	3099	7703	1541	205
2008	Bharti	85650733	3235	27705	5541	739
2008	Vodafone	60933152	2711	16520	3304	441
2008	Idea	38012845	2677	10175	2035	271
			ARPU for 2 Qs			
till Q2 2009	Bharti	102367881	1382	14152	2830	377
till Q2 2010	Vodafone	76449598	1212	9264	1853	247
till Q2 2011	Idea	47088878	1180	5554	1111	148

Data Source: COAI

It may be noted that as per MHz contribution to government revenue by top three operators averages to around Rs 483 crores per MHz for 2008. Table 1 had put the figure at about Rs 485 crores, which is close to the figure established in Table - 2.

From Table -2 it may be concluded that Bharti is the most efficient operator and has utilized the spectrum in the most efficient manner.

As per latest market reports, Bharti commands a 25% market share. 25% of total revenue for value Rs 103887 crores imputed from Table – 1 amounts to Rs 25971 crores, which is close to Bharti's revenue value of Rs 27705 crores for 2008 reflected in Table – 2, suggesting that the estimation techniques used to generate Table – 1 are fairly robust.

Vodafone, which reportedly has a market share of 17%, should have revenues of about Rs 17660 crores for 2008 when as computed from Table -1 as per above used methodology. This is close to the figure of Rs 16520 crores in Table – 2.

From the foregoing it is quite clear that spectrum squatting causes massive additional losses to the exchequer, **because the yield per megahertz by various players is quite substantial.** Therefore, an imposition of the yield after a delay of one year or two years is a must on all license holders lest they play out their game by spectrum squatting.

Interest of promoter(s) of company wherein new investor(s) invest in the equity shares of the company:

Scenario 1- Investor purchases shares from promoter:

- A (Promoter) holds 100 shares of a face value of Rs. 10 each in XYZ Ltd.;
- B (Investor) purchases 50 shares of XYZ Ltd. from A at Rs. 100/- each per share;
- A makes a capital gain of Rs. 90 per share on the aforesaid sale of 50 shares of XYZ Ltd. to B.

Scenario 2- Investor is allotted new shares of the company at par:

- A (Promoter) holds 100 shares of a face value of Rs. 10 each in XYZ Ltd.;
- XYZ Ltd. issues 100 shares of Rs. 10 each at par (*that is Rs. 10*) to B (Investor);
- A (Promoter) loses his control over the company from 100% to 50% and XYZ Ltd. equity base has increased from 100 to 200 shares of Rs. 10 each.

Scenario 3- Investor is allotted new shares of the company at premium:

- A (Promoter) holds 100 shares of a face value of Rs. 10 each in XYZ Ltd.;
- XYZ Ltd. issues 100 shares of Rs. 10 each at a premium of Rs. 90 each to B (Investor);
- A sum of Rs. 90 per share shall be transferred to an account, to be called the "securities premium account";
- Pursuant to sub section (2) of section 78 of the Companies Act, 1956 (the "**Act**") the securities premium account may be applied by the company-
  (a) in paying up unissued shares of the company to be issued to members of the company as fully paid bonus shares;
  (b) in writing off the preliminary expenses of the company;
  (c) in writing off the expenses of, or commission paid or discount allowed on, any issue of shares or debentures of the company; or
  (d) in providing for the premium payable on the redemption of any redeemable preference shares or of any debentures of the company.

  In scenario 3, the promoter does not benefit directly as the incoming capital accrues to the company. However, the influx of fresh funds into the company results in two benefits to the promoters.

  Firstly, the influx of fresh funds into the company results in an immediate increase in the company's net worth and the market value of the company's stock thereby giving the promoter an opportunity to offload his holding or a part thereof at a higher value, resulting in an indirect gain.

  Secondly, the promoter gains a future right to bonus issue(s) against the freshly created securities premium account resulting from the fresh infusion of capital. The Company subject to compliance with the requisite guidelines under the Act may allot bonus shares to the members of the Company almost immediately post the infusion of fresh funds thereby increasing the number of equity shares held by the promoter. The promoter may then be in a position to offload the bonus shares at the higher market value achieved by the company's stock, thereby making overnight profits.

  Hence, the clause of lock in of promoter's equity needs to be carefully drafted, such that the promoter is neither able to dilute any of his current holding nor is he able to sell any of the bonus shares issued, as per the above described process, during the prescribed lock in period. Any such sale may become possible only after the lapse of the lock in period or post the company meeting its rollout obligations.

Annexure 5

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Telecom sector rings in Rs 45,000 crore for govt

Shalini Singh | TNN

New Delhi: Whether it's a slowdown or recovery, India's telecom story is always shining. The telecom sector's contribution to the exchequer is growing exponentially. Latest data reveals a near 50% increase in licence fee receipts over the last five years and an over 250% increase in **spectrum** charges. In 2009-10, the telecom sector is estimated to contribute around Rs 45,000 crore to the government's kitty.

The licence fee has moved up from Rs 6,816 crore in 2004-05 to Rs 9,511 crore in 2008-09. It is expected to cross Rs 10,000 crore in the current financial year.In 2007-08, the government saw a spike in total licence fees to Rs 21,355 crore due to an additional one-time Rs 9,000-crore entry fee payable on account of the 120 licences awarded by DoT in January 2008.

The entry fee contribution has been a matter of controversy as many experts believe that if government had held proper auctions for 2G **spectrum**, the entry fee would have been close to Rs 60,000 crore. This figure is based on the valuations created by Unitech and Swan when they entered into agreements with Telenor and Etisalat respectively.

The proportionate increase in **spectrum** charges received by the government during 2004-09, is far higher than the increase in licence fee. As operators' subscriber base went up, they received additional allocations beyond 6.2 MHz, with percentage revenue share payable also increasing proportionately, both in absolute and relative terms. **Spectrum** charges are expected to cross Rs 5,000 crore or $1 billion during 2009-10. Overall, licence fees and **spectrum** charges could raise upwards of Rs 15,000 crore or $3 billion for the government in 2009-10. It is expected that if 3G and WiMax auctions are held as planned in 2010, an additional Rs 30,000 crore or $6 billion could be raised, taking the total contribution in 2009-10 to Rs 45,000 crore or $9 billion.

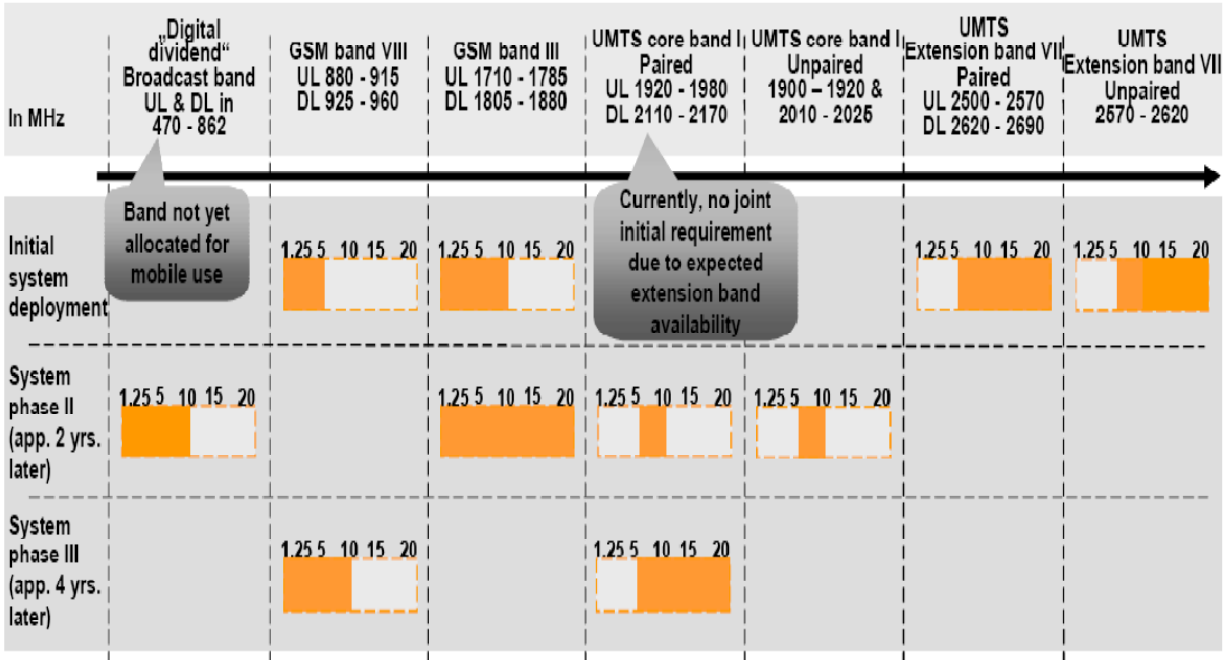
The government has opted to hold open, multi-stage bidding for 3G and WiMax **spectrum**. It is expected that each pan-India slot of 5 MHz x 2.1 GHz of 3G **spectrum** will sell upwards of Rs 6,000 crore as the reserve price itself has been fixed at Rs 3,500 crore on a pan-India basis. The sector has been in the shadow of controversy over the last two years, including CBI raiding DoT and interrogating several middle and senior level officers over an alleged **spectrum** scam. Experts believe that despite such issues, the sector will continue to do well at least in the short term. However, some serious margin pressures, as operators cross the 500-million mobile mark and start serving the unconnected rural hea r t l a n d , aren't ruled out.

LTE Deployment Strategy

Considerations

- Initial deployment
  - Overlay
  - Slow approach aiming to provide initially high speed nomadic access
  - Fast approach aiming to provide initially coverage and mobility
- Spectrum to be used
  - Initial deployment is considered in the 2G refarmed bands and 3G extension band
  - if lower frequencies are available in time for deployment, they will have a higher priority

NGMN operators view for Western Europe



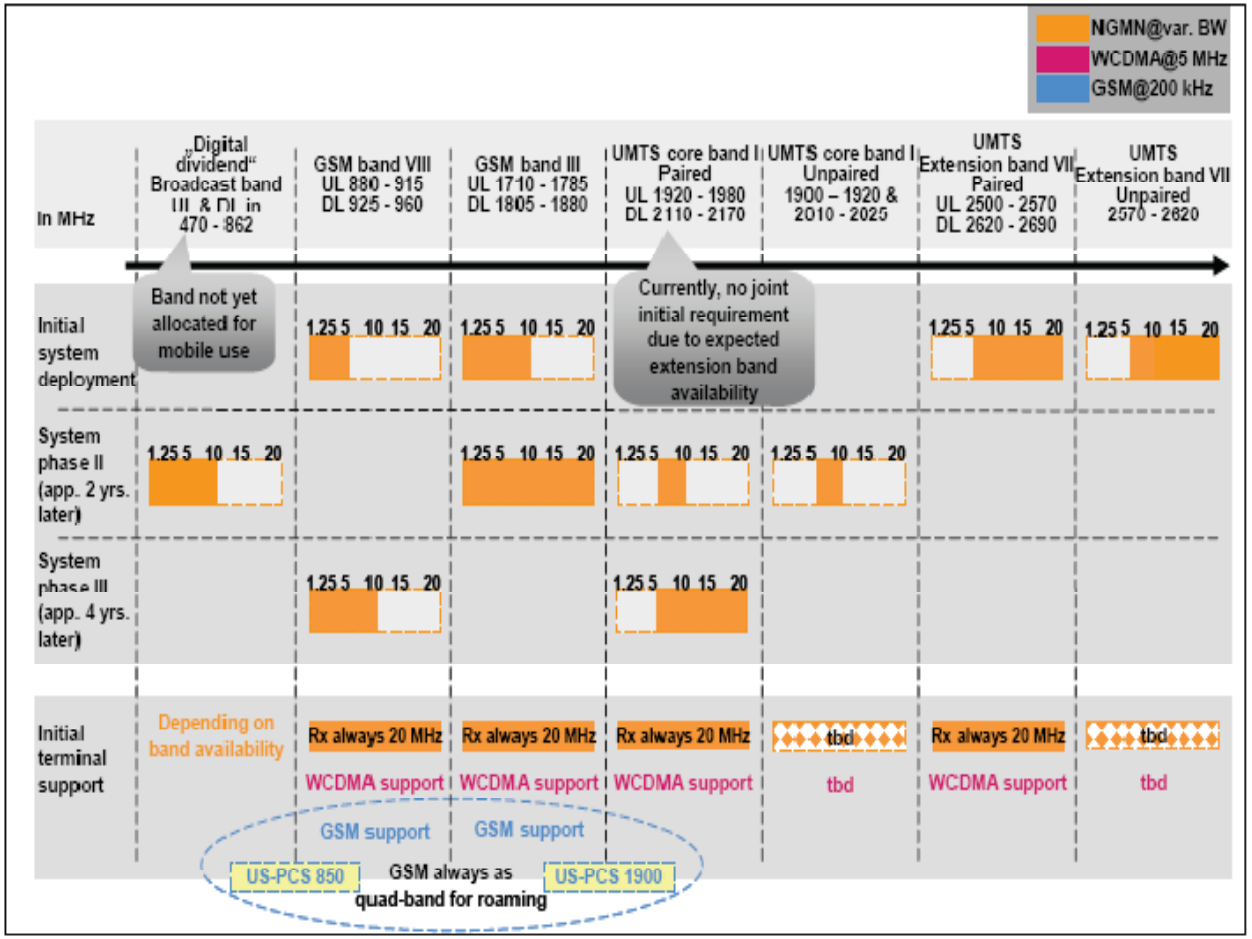
- Growth of coverage, capacity and spectrum usage (network sharing could be a cost effective option)
- Inter-working with UTRAN/GERAN
  - Stand-alone deployment: rapid deployment of LTE without inter-working with UTRAN/GERAN
  - Integrated with existing UTRAN and/or GERAN deployment: LTE is deployed in the same geographic area as existing UTRAN/GERAN with some inter-working

NGMN view on LTE deployment

(Western Europe)

NGMN recommendations

- Larger bandwidths most likely to be used in bands that are least likely to be fully loaded by 2G and 3G traffic
- If lower frequencies are available in time for deployment, those frequencies will have a higher priority
- Unavailability of certain spectrum, e.g. the UMTS extension band, might give higher priority for other bands, e.g. the UMTS core band, for initial deployment



2G Spectrum Refarming

Current Status

- Several Western European counties have already authorised/planned the refarming of the 2G bands
- Up to now 2G refarming took place after agreement between the regulators and the operators without waiting for the expiry of the GSM licenses
- It is expected that 2G refarming in Eastern Europe will be later than in Western Europe

Country	Band	Refarming Date/ Auction Date
Finland	900/1800MHz	Refarmed & UMTS 900 deployed
Switzerland	900/1800MHz	Reframing authorised but no deployment yet
Portugal	900/1800MHz	Reframing authorised but no deployment yet
France	900/1800MHz	1H 2008
UK	900/1800MHz	E2008-B2009
Spain	900/1800MHz	E2008-B2009

2.6GHz Spectrum Auctions

Ericsson is the only vendor to have announced the launch of WCDMA/HSPA in the 2.6GHz

Current Status

- Several Western European counties have already planned the auction of 2.6GHz band
- Norway is the first country to award 2.6GHz licenses to five companies
  - Arctic Wireless, Craig Wireless Systems, Hafslund Telekom, NetCom and Telenor
  - Expected to be used for fixed, nomadic and mobile wireless broadband services

Country	Band	Refarming Date/ Auction Date
Norway	2.6GHz	Q4 2007
UK	2.6GHz	Q1 2008
Germany	2.6GHz	1H 2008
Austria	2.6GHz	Q2 2008
Sweden	2.6GHz	Q2 2008

2.6GHz Situation in Europe (1)

County	Current Use	Expected Availability
Belgium	Mostly free	Q1 2008
Bulgaria	National Security and Defence	20MHz 2H 2007
Cyprus	Free	Available
Czech Republic	Military	~2012
Denmark	Electronics News Gathering / Outside Broadcast (ENG/OB)	Not known
Estonia	Fixed and mobile services	Q1 2008
Finland	Fixed radio links	Q1 2008
France	Ministry of Defence	After 2010
Greece	Rural Fixed Networks	After 2008
Hungary	Military	Not known
Ireland	Microwave Multipoint Distribution Systems	After 2014

2.6GHz Situation in Europe (2)

County	Current Use	Expected Availability
Italy	Ministry of Defence	Q1 2008 (maybe partly)
Latvia	Microwave Multipoint Distribution Systems	Not known
Lithuania	Microwave Multipoint Distribution Systems	Q1 2009
Luxembourg	Free	Available
Malta	Military	Not known
Netherlands	One licence (use not known)	Q1 2008
Poland	ENG/OB	Q1 2008
Portugal	ENG/OB	Q1 2008
Romania	Military	Possibly after 2010
Slovakia	Microwave Multipoint Distribution Systems	Q1 2008
Slovenia	Fixed P-P links	Q1 2008
Spain	Fixed P-P links	Q1 2008

Spectrum Issues (Europe)

Both can be deployed at current 3G frequency bands as well as 2G bands when refarmed

Europe	**Available 3G Bands**	• 2100 MHz with 60 MHz paired bandwidth
	Upcoming 3G Bands	• 900 MHz with 35 MHz paired bandwidth • 1800 MHz with 75 MHz paired bandwidth • 2600 MHz with 70 MHz paired bandwidth

HSPA+

- Considered as an upgrade from 3G/HSPA
- To be deployed at same frequencies and carrier bandwidths (5MHz) as 3G/HSPA
  - 2.1GHz is considered as the main frequency band for HSPA+ deployment
  - 900MHz is also a likely band for further HSPA+ deployment for wider area coverage
- Hotspot cluster deployment expected initially

LTE

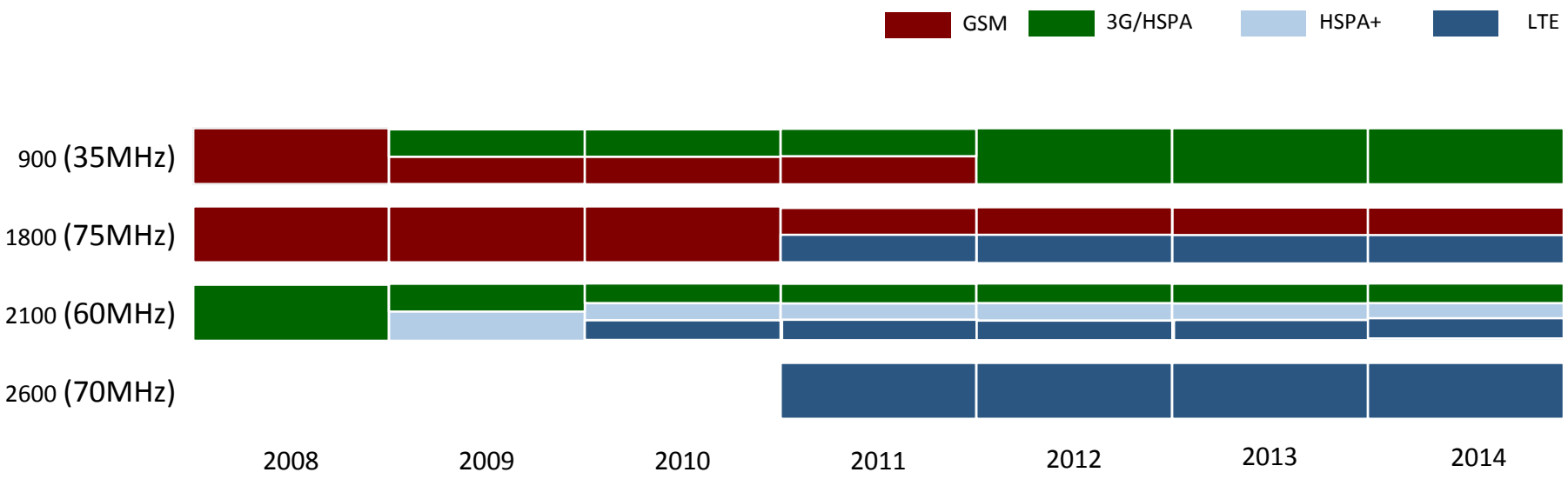
- Considered as a separate deployment (& investment) to 3G/HSPA
- Possibly to be deployed mostly at carrier bandwidths of 10MHz and higher
  - LTE is significantly superior to HSPA+ for carrier bandwidths of 10MHz and higher
  - Sporadic deployment possible in 2.1 MHz for green field operators
  - With most operators owning 3 carriers (15MHz) at 2.1GHz is expected that 3G traffic will have used at least 2 carriers by the LTE time fame, leaving one carrier free (5MHz) for LTE
- Most likely band to be deployed is 2.6GHz
  - 1800MHz and 900MHz are considered as a possible LTE bands in subsequent years assuming operators will move their 2G subscribers to 3G/LTE
- Hotspot cluster deployment expected initially

Spectrum Scenarios (1) (Europe)

Scenario 1: LTE initial deployment at 2.1GHz
(Good LTE uptake rate by end users)

Assumptions

- LTE is initially deployed at 2.1GHz at 5MHz ensuring easy and fast upgrade from 3G RAN
- LTE is later deployed at 2.6GHz at higher carrier bandwidths
- After LTE uptake, 2.1GHz is used only for 3G/HSPA+
- LTE is being deployed at 2G refarmed bands and 2G traffic is moved slowly to LTE

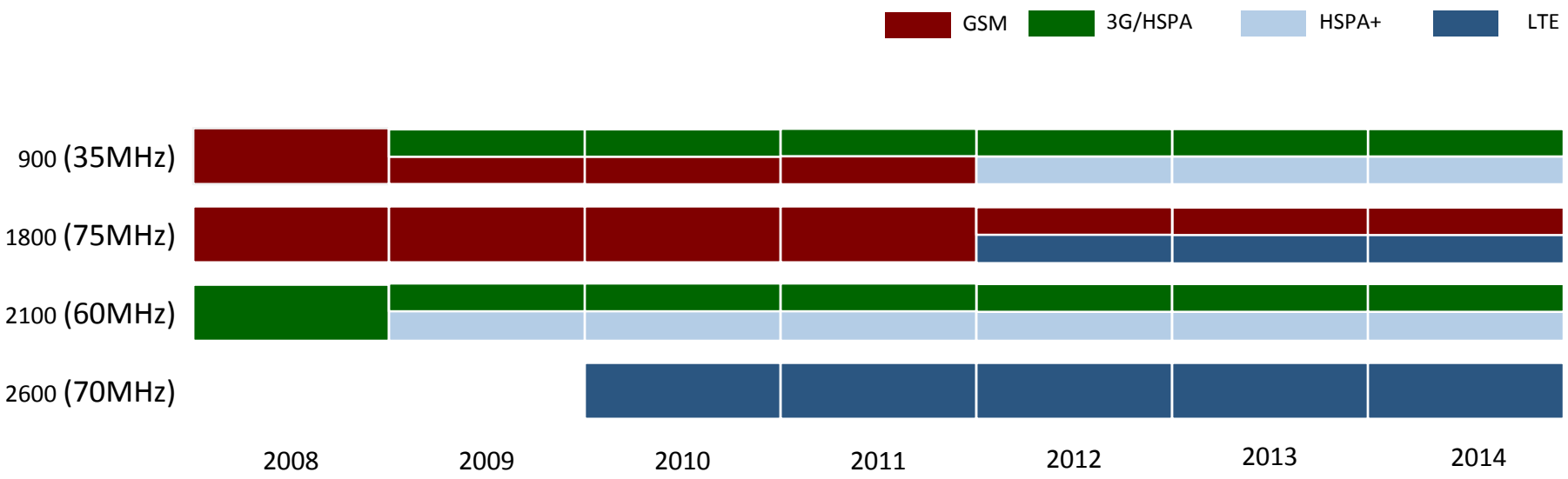


Spectrum Scenarios (2) (Europe)

Scenario 2: LTE is deployed parallel to 3G/HSPA+ at carrier bands >=10MHz
(Good LTE uptake rate by end users)

Assumptions

- 2.1GHz is used only for 3G/HSPA+
- 900MHz becomes the second main 3G/HSPA+ band with 2G gradually removed
- LTE is deployed mainly at 2.6MHz at carrier bandwidths of 10MHz and higher
- 2G traffic is moved to 3G and LTE is being deployed at 1800MHz at carrier bandwidths of 10MHz and higher

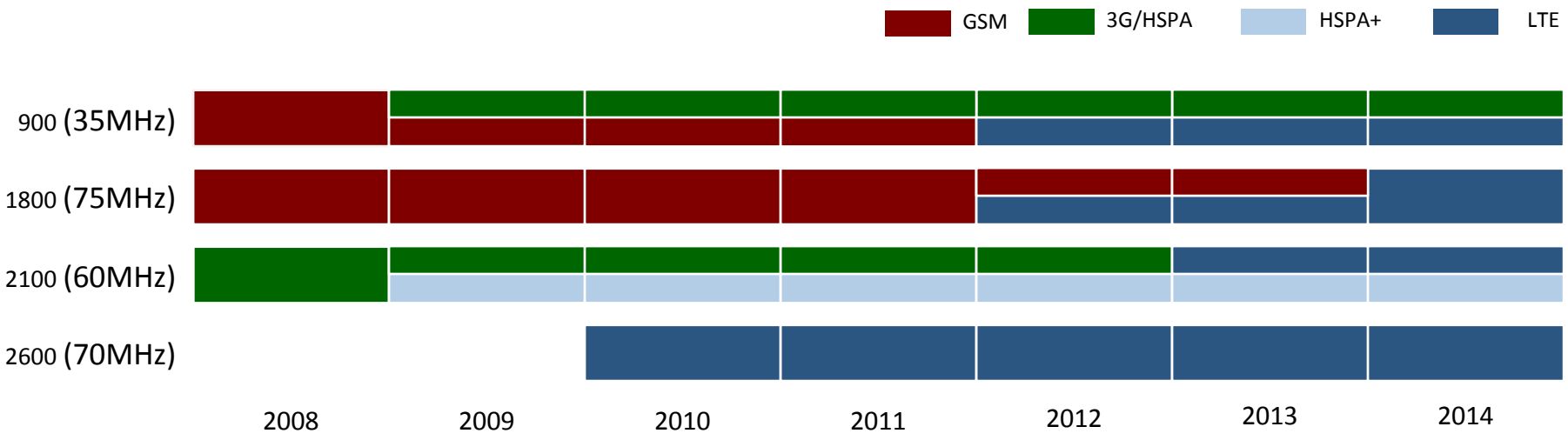


Spectrum Scenarios (3) (Europe)

Scenario 3: LTE takes over gradually 3G/HSPA+ at carrier bands >=5MHz
(LTE is a big success with end users)

Assumptions

- LTE is deployed initially at 2.6MHz at carrier bandwidths of 10MHz and higher
- 2G traffic is moved slowly to 3G and LTE is being deployed at 1800MHz at carrier bandwidths of 10MHz and higher
- Success of LTE experience drives operators to limit HSPA+ deployment at 2.1GHz
- LTE is being gradually deployed to all available 3G bands with 3G only at 900MHz

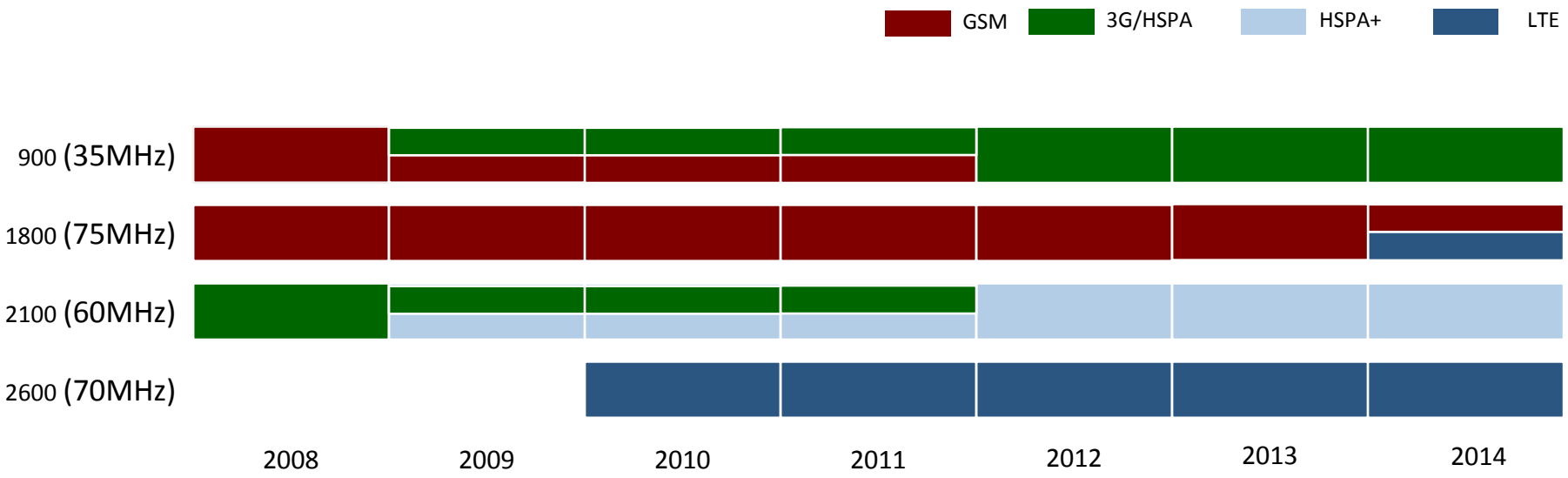


Spectrum Scenarios (4) (Europe)

Scenario 4: 3G/HSPA/HSPA+ remains stronger than LTE
(Slow LTE uptake by end users)

Assumptions

- LTE is deployed initially at 2.6MHz at carrier bandwidths of 10MHz and higher
- End users adopt LTE very slowly while 3G/HSPA+ remains the main mobile technology for few years after LTE introduction
- 3G is mainly deployed at 900MHz while HSPA+ is a success and deployed at 2.1GHz
- 2G traffic remains strong at 1800MHz



4th December 2009

DUA Consulting

Dr. JS Sarma
Chairman
Telecom Regulatory Authority of India
Mahanagar Doorsanchar Bhavan
Jawaharlal Nehru marg
New Delhi 110 002

Subject: **Submission of supplementary inputs by Dua Consulting On TRAI Consultation Paper No. 6/2009**

Respected Dr Sarma

Thank you for the opportunity to allow us to make our submissions to the TRAI Consultation Paper no. 6/2009 on key issues relating to licensing and spectrum. The Open House Discussions conducted by the Authority for this consultation paper was one of the best TRAI discussions that I have attended in many years, in terms of ambience, infrastructure and the opportunity offered to express our views.

As requested, enclosed please find our supplementary inputs on the Consultation Paper no. 6/2009, which the Authority had sought post the open house discussion.

With best personal regards & Seasons Greetings

Yours sincerely

B.K. Syngal
Senior Principal

Encl: as above

Supplementary inputs by Dua Consulting for TRAI Consultation Paper no. 6/2009 'Overall Spectrum Management and Review of License Terms and Conditions'

The three day long TRAI open house discussion brought together several telecom related stakeholders and during the discussions, it became evident that the regulatory mess created by the government is deep seated. Stakeholders seemed to be of the opinion that the regulatory environment needs to be changed such that policies become clearer and an element of transparency is introduced in the spectrum allocation process. Easing of the Mergers and Acquisitions (M&A) guidelines, which are restrictive and anti consolidation at present, is another key demand of the industry.

We would like to re-emphasise that the genesis of the structural failure in regulation and policies has been leading to litigation, CBI enquiries, media outcry and uneasiness amongst the stakeholders with regard to the 2G spectrum allocation methodology and the upcoming 3G auctions are due to **key TRAI Recommendations of 2003 having been completely overlooked by policy makers. These key recommendations include:**

- **Creation of a plain vanilla license**
- **Issuance of new UAS license via a bidding process**

Since the UAS license came bundled with 2G spectrum, the Recommendation effectively meant that spectrum should be auctioned.

In complete disregard to its own recommendation, the TRAI in August 2007 issued fresh recommendations of **'No auctions' for 2G spectrum and 'No cap'** on the number of players. The de-linking of spectrum from license was also not considered. This recommendation failed to reconcile the balance between a finite resource and an infinite number of applicants wanting the resource. **Effectively, demand outstripped supply and policy makers took advantage of the conflict between 'no cap' and 'no auction' recommendation to create the fictional first-come-first-served (FCFS) policy, which is the very root of the regulatory imbroglio that the telecom sector finds itself in today. It may be noted that the late statements by the Minister of Communications suggest that policy has been framed as per TRAI recommendations. Clearly, policy makers have taken advantage of the dichotomy between the TRAI Recommendations of 2003 and the August 2007 TRAI Recommendations.**

The August 2007 TRAI Recommendations also made another flawed recommendation, which seem to have added to the regulatory mess in the sector. This recommendation was that, which favoured **combination of technology**. **Using this recommendation, the policy makers introduced a new license, and favoured an applicant in such a way that it was made to jump even the fictional FCFS queue for the grant of spectrum.** This TRAI recommendation was in complete disregard to the terms and conditions of the existing UASL licenses, where in the choice of technology had to be declared before assignment of spectrum and undertaking given that there is not more than 10% cross holding in another entity in the same area of operation. In quite a few cases the same dispensation was disallowed only a few years earlier. **Moreover, spectrum was granted to this combination of technology player at prices discovered in 2001 and spectrum was also doled out to those in the FCFS queue at 2001 prices.** Ironically, the price discovered in 2001 was via the process of auction. It may also be stated that this combination of technology player is habitual of subverting regulation for its own benefit as was evident during the open house discussion.

The second beneficiary of this combination of technology regulation meekly followed the first company, as it had done earlier in 2003, when both these companies made a backdoor entry into mobility via legalisation or conversion of their basic telephony licenses into mobility licenses by payment of a differential fee between the two licenses. However, it may be noted, that the two companies had already commenced their mobility services prior to the conversion of their licenses.

Spectrum Should be Auctioned

Our suggestions for the consideration of the Authority, to iron out these anomalies, are either to **auction all 2G spectrum** that has been distributed at 2001 prices recently or to ask the recipients of this spectrum to pay an **indexed price at 15% per annum**, with 2001 being the base year. This works out to approximately Rs 5050 crores for a PAN India UASL License. This methodology is likely to help weed out non-serious players and mere speculators and also help level out the playing field. It may also be noted that the Mishra Committee in its report released on 7th Jan 2008, three days prior to the FCFS scandal, has also recommended the auction of spectrum. Summary of the Mishra Committee report's

findings and recommendations are included as Annexure 1 of our main submission. **We request the Authority to take into account the findings of this report.**

It also worthwhile noting that the above mentioned license fee of Rs 5050 crores is permitted to be amortised over a 20 year period. In effect, this works out to about Rs 20 crores per month, which is justifiable as capex expenditure and as it also offsets the savings that the operator has made by not needing to enhance infrastructure related expenses. Thus, while the operators may keep seeking softer terms, such transfer of income to private pockets, which should rightfully accrue to the public exchequer, should not be allowed.

DoT has via public statements had suggested that auctioning of 2G spectrum was not legally viable and due to level playing field issues. One fails to understand that if the license was auctioned in 2001, how auctions were legally tenable then and are not legally tenable now. It appears that the dishing out of licenses and doling out of spectrum at 2001 prices has been done to favour few players. Moreover, it may be noted that even the FCFS was curtailed to those who applied for the license to an arbitrary cut off date of 25th September 2007 after having announced that the cut off date for receiving UAS applications would be 1st October 2009. A Single Bench Delhi High Court quashed this notification in an order in July 2009 and the order has been upheld in another Division Bench judgement in November 2009. The orders implicate that all applications made till 1st October 2007 are eligible for the grant of a UAS license and spectrum, subject to its availability.

Spectrum Squatting Charges

Another key suggestion that we would like to make is the imposition of spectrum squatting charges to deter speculators and spectrum hoarders. We believe that such charges should be imposed as punitive measures under the TRAI Act 1997 for enforcement of license conditions. Please refer to our detailed submission on spectrum squatting, which forms Annexure 3 or our main submission.

De-linking of License and Spectrum

Going ahead, we firmly believe that there should be a de-linking of the license and spectrum. There should be only one license, the entry fee for which can be revisited every 3 to 5 years. This license should permit players to offer telecom services that do not require

spectrum and also allow them to bid for spectrum or obtain spectrum via spectrum trading or spectrum sharing for offering spectrum related services. The license can also carry a license fee on yearly basis as percentage of its revenues. The license should be issued with a proviso that if the licensee undertakes no telecom related activity as permitted by the license within a period of three years with or without spectrum, the license would stand automatically revoked, without the player being disqualified from applying afresh. This proviso would help weed out non-serious players. Grant of such licenses should be in accordance with other regulatory requirements such as FDI limits, security clearances etc, which should be in place before the start of service or as mandated by the law. It may also be noted that the plain vanilla license will also encourage enhancement of basic telephony, which as of now is on the decline. An introduction of this license will also be attractive for those seeking entry via 3G auction.

We would also like to suggest that the recommendations towards a plain vanilla license and spectrum sharing are done in a manner such that infrastructure companies, including tower companies are able to acquire such a license and bid for spectrum. The spectrum sharing policy should be framed in a way such that multiple operators are able to utilise this spectrum under the spectrum sharing policy and offer service. This we believe can help bring down capex and opex costs and can promote **rapid proliferation of rural telephony**. Such a business model, if practical for infrastructure companies also would be aligned to the proposed MVNO policy. The acquisition of a plain vanilla license and the subsequent payment of annual license fee by infrastructure companies can also help prevent any potential government revenue leakages, which operators can manipulate by transferring some of their voice revenues to their tower subsidiaries.

In view of the various developments including the adverse High Court judgements, CVC enquiries resulting in CBI investigations and most recently a CAG probe, it may be prudent to move to a more enabling regulatory environment and get into commercial settlements rather than getting into long drawn legal battles, which could be harmful for the image of the sector and could have a negative impact on the inflow of FDI into telecom.

Spectrum Management

On spectrum management, we would like to suggest that a transparent methodology needs to be adopted such that spectrum, which is a scarce national resource gets allocated to the best possible usage, while returns to the public exchequer are also maximised.

Efficient management of spectrum is enshrined in the TRAI Act 1997 and thus is one of the key responsibilities of the Authority. In respect of this, we would like to suggest as a matter of abundant precaution, that the Authority should look into the efficient utilisation of bands from 400 MHz to 4 GHz, which as per present technologies can be used for mobile operations and also to provide access services, where provision of a fixed network may be logically difficult. **It may also be noted that excess fragmentation of spectrum is leading to nearly 10% to 15% wastage of usable spectrum due to the need of guard bands for preventing interference.** As a part of the study, on these bands, the Authority could prepare a white paper, which identifies spectrum usage between commercial and non-commercial usages including government entities using spectrum as also the impact of spectrum fragmentation, which would be a valuable input in understanding the degree to which M&A regulations need to be eased such that precious spectrum is not wasted.

Pursuant to the study on the above bands and current usage, we would like to suggest that **the Authority should undertake to re-align the utilisation of this spectrum as per ITU recommendations and practises elsewhere, in a proactive manner in order to get the digital dividend by introduction of newer and more spectrum efficient services.** As a case in point the following may be noted:

Switzerland Starts Preparing for Radio Spectrum Auctions in 2013

Switzerland's Federal Communications Commission (ComCom) has instructed the Federal Office of Communications (OFCOM) to prepare the allocation of mobile radio frequencies which are either currently free or which will become free in the foreseeable future.

ComCom is expected to launch the public invitation to tender for these frequencies in the course of the next year. **The allocation of frequencies will take place by auction.**

ComCom has instructed OFCOM to begin the preparatory work for the public invitation to tender for mobile radio frequencies which are either currently free or which will become free in the foreseeable future. The invitation to tender is taking place with particular reference to the current GSM and UMTS licences which expire on 31 December 2013 and 2016 respectively. In addition, other frequencies from various mobile radio bands will be available for the provision of mobile radio services. It is intended that an early allocation of these frequencies will offer players in the market a long-term perspective for planning.

The proposed procedure is intended on the one hand to enable any new operators to acquire mobile radio frequencies. On the other hand, existing operators will have the possibility of equipping themselves with sufficient frequencies for the future.

OFCOM will now prepare the tender documentation and the design of the auction for the attention of ComCom. On this basis, ComCom will decide on the next steps and is expected to launch the invitation to tender for the mobile radio frequencies in the course of 2010. The invitation to tender will be open to all interested companies.

Some other international examples:

In the case of the US, **"Digital Dividend"** spectrum will become available (700MHz or 800MHz as it is referred to in Europe) after the planned transition to digital broadcasting takes place. Current and potential mobile competitors argue that the original cellular operators should be restricted in their access to this new spectrum below 1GHz, or they themselves who currently have none will be placed at an unfair competitive disadvantage. **In the U.S. where no limitations on bidders were included in the 700 MHz auction the bulk of this valuable spectrum was indeed acquired by the successors of the original cellular competitors, namely Verizon Wireless and AT&T.** The situation regarding spectrum below 1 GHz is being debated in the U.K. (and elsewhere), and a compromise sought (return of some existing 850/900 MHz attributions and/or caps on spectrum holdings below 1 GHz) that will ensure effective competition between a number of mobile operators greater than two. Even the auction of 2.6GHz spectrum in the U.K. has been delayed for this reason among others. Newer mobile competitors and regulators can argue that since no competitor can compete fairly without access to frequencies below 1 GHz operators who do not hold such spectrum already cannot reasonably value 2.6GHz spectrum for the purpose of deciding how much to bid until and unless they know whether their competitors who do hold such spectrum will or will not be restricted in bidding for additional frequencies (800 MHz) below 1 GHz.