TVR/COAI/105
16 July 2004

The Telecom Regulatory Authority of India
A-2/14, Safdarjung Enclave
New Delhi – 110 029

Dear Sirs,

Consultation Paper No. 11/2004 on Spectrum Related Issues
- Efficient Utilization, Spectrum Allocation and Spectrum Pricing

We welcome the initiative of the Authority in embarking on a Consultation on Spectrum Related Issues and are pleased to enclose the Response of the COAI to the above-mentioned Consultation Paper.

We request the Authority to kindly condone the marginal delay in meeting the deadline of 15 July'2004.

Kind regards,

Sincerely yours,

T. V. Ramachandran
Director General

Encl : Volume I : Executive Summary
Volume II : Detailed Response & Annexures
Volume III : COAI's submission on ABTO Proposal for Additional Spectrum in PCS 1900 (US) Band

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COAI'S RESPONSE TO

TRAI'S CONSULTATION PAPER NO. 11/2004

ON

SPECTRUM RELATED ISSUES

VOLUME – I

EXECUTIVE SUMMARY

CELLULAR OPERATORS ASSOCIATION OF INDIA

JULY 16, 2004, NEW DELHI

COAI'S RESPONSE TO THE TRAI'S CONSULTATION PAPER NO. 11/2004
ON SPECTRUM RELATED ISSUES

EXECUTIVE SUMMARY

A. INTRODUCTION

1. At the outset, we would like to welcome this initiative of the Authority to look into the spectrum related issues. Spectrum is a key resource vital for providing mobile services and the Government's Policy on the important issues of spectrum allocation, pricing and its efficient usage will play a crucial role in deciding the future role of the Indian wireless sector in contributing to country's national telecom objectives.

2. We believe the most important objective of the Authority should be to maximize benefits to the entire population of potential mobile users in India - in terms of extensive mobile service availability, low prices and good quality of service. This can be achieved by encouraging, introducing and facilitating fair competition among mobile operators.

3. In this context, we believe that there are serious implications and risks associated with some of the choices discussed in the consultation. We are of the view that a number of options discussed in the consultation will put the GSM operators at a serious unjustified disadvantage to CDMA operators. This imbalance would likely lead to far-reaching and adverse consequences which could include market exit and a resulting increase in market power among the remaining operators. The resulting reduction in competition would be to the ultimate detriment of mobile users across India, and it would be irreversible.

B. CONTEXT OF THE RECOMMENDATIONS

4. It is submitted that the reference to the Authority by the Government to consider the "Efficient Utilization of Spectrum," entails examining the efficient utilization of the respective spectrum that has been allocated to the mobile operators for providing their mobile services This is also the position taken by the Expert Committees on Spectrum set up by the Government on GSM and CDMA which have looked into the issue of optimum utilization of spectrum allocated to GSM and CDMA operators and laid down separate subscriber-linked milestones for additional spectrum assignments to both GSM and CDMA operators.

5. We believe that the Authority has erred in taking this reference as the mandate to make recommendations on the comparative efficiencies of the existing technologies. This is incorrect, unjustified and unfair. The Regulator has to maintain a technology neutral position and ensure that all regulatory decisions are aimed at ensuring free and fair competition between competing technologies.

6. It may also be noted that it was only after a critical examination of all possible technology options that the Government selected GSM as the technology of choice for introducing cellular mobile services in the country. India has benefited from this far-seeing decision of the Government as GSM continues to be the dominant technology, both worldwide and in India, reaching 1.1 billion mobile consumers worldwide and accounting for over 75% of all digital mobile subscribers and 80% of all new additions.

7. It is thus not only outside the framework of reference but also incorrect and improper to now embark on a comparative analysis of two technologies and that too, on the basis of one single characteristic, which has led to erroneous conclusions.

8. Whilst maintaining that a comparative analysis of the two technologies is not the context in which the reference has been made by the Government, we nevertheless strongly disagree with the various statements made in the Consultation Paper claiming that CDMA is a more efficient technology than GSM. We do not agree with this view as in any comparison, the efficiency or otherwise of any technology will depend on the basic assumptions and the specific situation taken into consideration.

9. In an environment where different technologies co-exist in an open market for providing the same service, it is unjust and unfair to talk about 'superior' and 'inferior' technologies. The ultimate advantages / benefits of a technology is the result of a summation of several complex attributes. In the case of mobile services, it is the result of an inter-play of aspects such as seamless connectivity, interoperability, roaming, cost-efficiencies resulting from economies of scale, richness of services, user experience, etc.

10. The inaccuracy of the misleading conclusions drawn in the Consultation Paper, can be seen from the market scenario and the ground realities. If GSM were to be a second best or inferior technology, then why do majority of the world mobile users still prefer GSM?? It is a well-known fact that GSM is the most widely used digital technology in the

world reaching 1.1 Billion mobile subscribers worldwide and accounting for over 75% of the world's digital mobile subscribers and 80% of all new mobile subscribers.

11. Further, in the case of 25 top data operators, recent analysis by EMC has indicated that 22 use GSM/ GPRS/ EDGE/ WCDMA platform, 2 use PDC/ WCDMA platform and only 1 uses CDMA platform.

12. We believe that it would be difficult, if not impossible for anybody to categorically conclude on such a globally controversial subject as to which technology is more efficient. We believe that it would be best to leave the decision to market forces to determine which technology delivers greater value to customers.

13. It is respectfully submitted that the methodology and assumptions of the Authority on the technical efficiency of spectrum utilization are discriminatory and biased against the GSM industry:

a. The Consultation Paper has considered a multi-layered architecture only for GSM and not for CDMA.
b. Considering the deployment of micro / pico sites only for GSM is discriminatory and unjustified. While Indian GSM operators are already using a variety of advanced techniques for optimal utilization of spectrum, the CDMA operators have not even deployed equal density of macro sites let alone adequate micro / pico sites in their networks.
c. The Paper gives little thought to the scope to increase CDMA network capacity despite the Authority itself noting that the CDMA networks "were not found to be congested at the current traffic levels."
d. To the best of our knowledge, the 9-cell cluster used by the TRAI for GSM, is neither practicable not possible and therefore any results derived from this assumption are incorrect
e. The Consultation Paper cites international practice of only 2-3 sites per sq km. and a maximum packing density of only 5-sites/sq km. for CDMA. This is misleading and incorrect, as the CDMA technology does not put any restriction on the number of sites /sq km. and the constraints for restricting the number of sites in any given footprint are the same for both GSM and CDMA.
f. The calculations used for CDMA 1x networks under clause 3.2.2.1.2. are incorrect as the division factor should have been 5 (MHz) and not 6 for 4 carriers.

g. The Paper has also in a discriminatory manner chosen to dwell on the data requirements of CDMA operators while no such distinction has been made in the case of GSM operators.

14. The spectral efficiency of GSM networks is far higher in markets where operators have an adequate assignment of spectrum. This is because GSM has a non-linearity characteristic in the B Erlang table, which can be exploited at optimal levels of spectrum allocation. In this regard, we would like to suggest that the Authority may consider that as far as possible, wherever spectrum is available and can be coordinated, it may be made available to the GSM operators without linking it to subscriber numbers.

15. We believe that the in the context of the reference on 'efficient utilization of spectrum" requires the Authority to ensure that all mobile operators, whether GSM or CDMA operators, fully and optimally utilize their allocated spectrum before being entitled to fresh assignments. We believe that this could be ensured by CDMA operators making network investments to achieve base station density equivalent to that of the GSM operators. This will ensure optimal utilization of allocated spectrum and also ensure level playing field.

C. UNDER LICENSE, 1800 MHZ BAND IS FOR BOTH GSM & CDMA

16. The Authority has incorrectly presumed that the 1800 MHz band is only for GSM operators. Under the Unified Access Licenses, it is clearly stipulated that spectrum allocations to UAS Licensees will be in the 800/900/1800 MHz bands. It is submitted that any allocations to the UAS licensees must only be in their designated bands under license.

17. The DoT has also clarified that the cellular operators are only technology neutral within their designated frequency bands. This principle must apply equally to both GSM as well as CDMA operators. Thus, CDMA operators are technology neutral only within their designated bands of 800 MHz / 1800 MHz as per their license and the argument of technology neutrality cannot be used to move out of their designated frequency bands.

18. Further, as adequate spectrum as well as equipment exists in the 1800 MHz band, there is no reason or justification to consider any other band, including the US PCS Band for CDMA.

D. PREVAILING CELLULAR SPECTRUM USE POLICY MUST BE RESPECTED

19. The Government has most recently considered the spectrum requirements of both GSM and CDMA operators and arrived at clear roadmap for additional allocation of spectrum for GSM and CDMA operators. The Government Cellular Spectrum Use Policy was finalized after receiving inputs from an Expert Technical Committees which considered all techo-economic parameters, optimal utilization of spectrum, future growth forecasts, etc and after participation of all stakeholders, submitted its Report to the Government.

20. For GSM operators, it was only after examination of current utilization of assigned bandwidth, network design practices, international norms, etc., that the Spectrum Policy of the Government laid down a subscriber-linked formula for allocation of 2x15MHz per GSM operator as recently as August 2003. This Policy may now deemed to be part and parcel of the GSM operators' license as it has been implemented vide a Ministerial Order issued by the Ministry of Communications (WPC Wing) vide Letter No. L-14047/06/2004-NTG dated April 15, 2004 for graded spectrum charges for allocations upto 2x15 MHz.

21. For the CDMA operators also, a similar exercise has been undertaken and we understand from newspaper reports that the exercise has already been completed and that the Committee has recommended a subscriber linked formula for the CDMA operators. This decision too, should be implemented.

22. In light of the above, we believe that Approach I and Approach II are inappropriate for spectrum allocation as they do not take into account the above Spectrum policy of the Government and the fact that mobile operators have already acted upon this Policy.

23. Scarcity of spectrum should not impede the growth of existing operators and adequate spectrum must be reserved for existing operators before considering the allocation of spectrum to new entrants.

24. As long as the spectrum is used efficiently and additional assignments can be justified and principles of level playing field and fair competition are ensured, there should be no artificial limit placed on the amount of spectrum per operator.

E. SPECTRUM PRICING MUST BE IN CONSONANCE WITH NATIONAL TELECOM OBJECTIVES

25. The Authority's recommendations on Spectrum Pricing must consider:
    a. The national objective of ensuring high quality and affordable mobile services to consumers and the achievement of national tele-density objectives.
    b. The existing Cellular Spectrum Use Policy both in respect of spectrum allocation and pricing and ensure that the operators are no-worse off in the new environment.

26. In a highly competitive and price-sensitive market like India, operators do not have the freedom to generate super-profits, and therefore a higher tax will simply be passed on to customers (in the medium term, if not in the short term) in the form of higher prices or lower quality of service. This runs counter to the national policy and regulatory objective of making mobile telephony services much more widely available across India and thereby growing tele-density.

27. Economic research has shown that it is more efficient for a Government to tax final goods (revenues) rather than intermediate goods. In this context, spectrum is an intermediate good, and therefore imposing a tax on it is a poor long-term policy.

28. Since the Government already has a well-established "rationing" mechanism for ensuring efficient use of spectrum, i.e. by withholding additional spectrum assignments from operators until they have accumulated a prescribed subscriber base, there is no need to use spectrum pricing as a method to discourage the inefficient use of spectrum. The only effect of this will be to increase costs to operators and prices to customers.

29. Spectral characteristics is only one of the factors that determine the overall benefits / advantages of a technology – it should not be chosen the basis for putting in place a pricing mechanism that favours one technology over the other. As already pointed out, this is not the mandate under the consultation. The Regulator should maintain a technology neutral position and ensure that all regulatory decisions are aimed at ensuring free and fair competition between competing technologies.

30. It should be noted that the Indian GSM operators have paid amongst the highest entry fees in the world to acquire spectrum licenses to offer cellular mobile services. It is thus submitted that spectrum up to 2x15 MHz (which would somewhat be in line with

international practices) should be taken as the entitlement of the GSM operators under their license and they should be required to pay only a nominal usage charge (to cover the costs of administration & regulation) for this bandwidth.

31. Our preferred approach would be that spectrum usage charges should be sufficient to cover only the costs of administration and regulation (recovered on a revenue share basis from all operators).

32. However, to ensure efficient utilization of this resource, the principle of incremental revenue share for additional spectrum may be continued. However, the overall bar needs to be lowered, the incremental charges should be modest (as the Government will anyways gain from higher revenues) and there must be a cap prescribed on the maximum spectrum usage charges. It is suggested that the overall cap for spectrum charges be set at 2% of revenues for spectrum allocations up to 2x15MHz per operator. Within this overall cap of 2%, the Authority may adopt a stepped approach of, say, increments of 0.2 or 0.25%, for increased levels of spectrum allocation.

33. The advantage of the current revenue share regime is that it is fair, simple, transparent and easy to administer and it directly connects the price of the spectrum to the value of commercial activities that use it. Furthermore, this regime also ensures the efficient use of spectrum as additional spectrum is allocated at an incremental charge and only after reaching pre-defined subscriber milestones. The present regime is, in fact, a form of Administered Incentive Pricing (AIP), which has been customized to suit the Indian environment. As mentioned above, this regime only needs to be fine-tuned in order to rationalize the present very high level of charges. This regime has been finalized by the Government as recently as in August 2003 after extensive and elaborate consultations of all relevant aspects including optimal utilization, international practices, etc. This regime meets all the important objectives enunciated by the Authority for a spectrum pricing policy :

a. It promotes spectrum efficiency as spectrum is allocated only after full justification of existing assignments.
b. It is simple, transparent & easy to administer.
c. It will recover the costs of spectrum management
d. It will promote competition.

34. However, the version of AIP proposed in the Consultation Paper, is not acceptable for the following reasons :

a. It is based on a pre-determined conclusion that CDMA is the "most efficient technology" and that GSM is the "second best technology" We strongly disagree with this statement and we would also like to submit that it clearly establishes that the version of AIP proposed is not technology neutral.
b. All other things being equal, all that the AIP version proposed in the Paper would achieve would be an increase in operating costs for mobile operators leading to a corresponding increase in tariffs for customers.
c. Since GSM operators are already employing a variety of advanced techniques to ensure optimal utilization of their allocated spectrum, AIP will not have any incentivising effect or result in further efficiency gains.
d. The level at which AIP should be set is a practical challenge. If it is set exactly equal to the marginal cost of additional infrastructure, the choice between paying for more spectrum versus paying for more equipment will be determined in practice by economically irrelevant, short-term issues such as the relative lead times on provisioning the additional capacity. If they set it at all below the marginal cost of additional infrastructure, operators will always choose additional spectrum over additional infrastructure, and the mechanism will be ineffective. And if it set at substantially higher than the marginal cost of infrastructure, then given that the GSM operators are already employing all optimization techniques, it will either result in increased cost of service or in deteriorated performance.

35. We do not favour the auction approach, as we believe that it would only result in increased costs and corresponding increase in tariffs.

36. With the introduction of unified access licensing (fixed and mobile services) and the imminent introduction a full unified telecom license (all telecom services), the basis for charging for spectrum usage must also be aligned to a common basis for all wireless usage (fixed or mobile).

F. EARLY INTRODUCTION OF IMT-2000/ 3G IN ITU WARC-92 IDENTIFIED CORE BAND

37. Expeditious introduction of IMT-2000/ 3G is important and relevant for India as this will deliver maximum benefits to mobile customers in India, in terms of higher voice capacity, data-speeds, increased service offerings, etc., common with those other countries where these services have been introduced.

38. Spectrum for IMT-2000 / 3G services should be as per the WARC–92 identified Core Band (1920-1980 MHz paired with 2110 to 2170 MHz) and as allocated in the National Frequency Allocation Plan. This band is the only band in which commercial equipment is available and all countries that are offering IMT-2000 / 3G are doing so only in this band. Further, it is also truly technology neutral and will ensure the evolution of both GSM as well as CDMA operators to IMT-2000 in the most spectrally efficient, harmonized, interference-free manner.

39. The first round of 3G spectrum assignments from this Core Band should be made ***simultaneously*** to all existing, interested operators – GSM and CDMA. Under no circumstances should any consideration be given to pre-emptive assignment of *any* spectrum for 3G networks to a subset of the community of mobile operators in India. This would introduce unfair advantage and create non-level playing field.

40. International best practice, for Asia and Europe, indicate that 2 x 15 MHz should be reserved for each GSM operator. In order to gain any of the advantages of the IMT-2000 band, international convention must be followed and the band should be allocated in minimum blocks of 2x5 MHz.

41. Equipment rollout based on WRC identified bands is a time consuming and an involved process. Based on ITU-R recommendations, it took more than 10 years for the industry to come out with commercially available infrastructure for IMT-2000 applications / services in the WARC 92 identified band i.e., 1920-1980 MHz / paired with 2110-2170 MHz. As of today, 120 operators /licenses have been awarded in 40 countries, which have either commercially deployed IMT-2000/FDD mode (WCDMA) access standard (i.e., the evolution path to 3G for the GSM operators to migrate to IMT-2000 or are in different stages of deployment / launching (37 networks are already commercial with almost 6 million users; 60 networks expected to be commercial by end-2004).

42. Interference free operation is an important pre-requisite for efficient spectrum use, which is one of the fundamental mandates of the present consultation exercise. Use of the ITU WARC-92 globally harmonized spectrum for IMT-2000 will also ensure:
    - Interference-free operations
    - Optimal utilization of spectrum (no wastage by guard bands etc),
    - Facilitation of Global roaming
    - Availing of the benefits of the economies of scale of globally available standard equipment, etc

43. Almost all countries are adopting the principles of harmonized spectrum use and are allocating spectrum as per the ITU globally harmonized bands (WARC-92 identified) for IMT-2000. This is evident from the Chart that clearly brings out the fact that whilst ITU has identified bands for IMT-2000 in both WARC-92 as well as WRC 2000, all the countries that have gone in for IMT-2000 have done so in the WARC-92 identified bands.

44. In cases where part of this band had been allocated to PCS 1900 (US) MHz for historical reasons, those countries are revising / re-farming their frequency allocation plans so as to be in consonance with the ITU globally harmonized bands for IMT 2000.

45. The importance of spectrum harmonization was also emphasized by the ITU Regional Working Group on Private Sector Issues, which met on April 26-27 in New Delhi, which inter alia recommended :

> "Harmonized frequency allocation is essential for facilitating global roaming, economies of scale, wide competitions and benefits to the end-users…. the thrust of the ITU Recommendations was achieving global harmonization of spectrum use and that the same should be implemented."

These recommendations were consensually agreed between all stakeholders, including representatives from several Asia Pac and other countries as also representatives of DoT, WPC, TEC, ABTO and COAI.

46. If any bands other than the above WARC-92 identified band, such as the WRC-2000 identifications are considered for IMT-2000, then there is absolutely no chance/ possibility of any infrastructure being commercially available in the next several years, if not more. It may also be noted that even when equipment does become available, it would be costlier because of lower volumes of production. This would delay India's move to 3G thus depriving the millions of Indian mobile users from deriving the wealth of benefits associated with (WCDMA (GSM 3G) and CDMA) IMT-2000 products that will be available to most other mobile customers in the world.

47. In this context, it may be noted that consideration of the US PCS band entails very serious adverse implications for the existing as well as future operations of the GSM operators. This is because allocation of the US (PCS) band will directly reduce both the

available GSM 1800MHz band as well as impair the IMT-2000 band by severe harmful interference.

48. Allocation of any portion of the IMT-2000 WARC-92 identified band to CDMA, will block the evolution of the GSM operators to IMT-2000/3G thus denying the millions of Indian GSM consumers the opportunity to avail of the feature-rich experience of 3G services / applications. It will also lead to a waste of full 60+60 MHz of commercially viable, technology-neutral, interference-free, harmonized IMT2000 core spectrum.

49. Allocation of the US PCS band, in part or full, to the CDMA operators will cause a very high level of interference both in the BTS as well as in the terminals. This interference cannot be mitigated. While the Authority has noted the aspect of interference, it does not appear to have grasped the magnitude / intensity of the problem and its serious adverse implications. We believe that this is a very serious issue and such examination of the intensity of the interference and its adverse impact on QoS should be completed in an open, transparent and consultative manner, BEFORE any decision is taken that could jeopardize the future of both GSM and CDMA in the country.

50. Even the current GSM networks in 900 MHz are experiencing interference from CDMA networks in the 800 MHz band because of the allocation of part of the e-GSM band to CDMA. Efforts at mitigating this interference have not proved effective even though the duplex directions are the same, thereby rendering downgraded performance. The interference in the case of PCS 1900 MHz would be far worse and more severe, as the duplex directions are opposite.

51. Because of the above serious implications, there is no such country / example where 1900 MHz band has been allocated in the same city/geographical area to a CDMA operator where GSM was already operating.

52. It may also be noted that the mixed band plan of frequency arrangements PCS 1900 with IMT-2000 WARC-92 bands for paired IMT-2000 operation does not find a place in the ITU recommended options for IMT-2000.

53. Even 4 years after WRC 2000, there is no country in the world that has chosen the mixed band plan of trying to combine the US (PCS) band with the IMT-2000 Core Band.

54. It is also important for IMT-2000 / 3G to be dealt with separately from 2G. This is because IMT-2000 spectrum is clearly earmarked for 3G applications and use of this band as a continuum of 2G, would reduce the overall utility of the band, and the scope for 3G services, causing severe disadvantages to Indian customers of throwing away the various and significant benefits of harmonization of this band with the global IMT-2000 community.

55. Further, we do not believe that there is even one country in the world where 3G has been treated as a continuum of 2G.

56. Such an action would unfairly penalise GSM operators by denying them an upgrade path for evolution to 3G while CDMA operators by virtue of being selectively and preferentially given spectrum from the IMT. This would be clearly contrary to the TRAI's fundamental objectives of maintaining a level playing field among all operators, international practices, etc.

57. Further, the licenses of operators and the National Frequency Allocation Plan clearly prescribe the 2G spectrum bands as 800/900/1800 MHZ bands. A total of 2x75 MHz has been earmarked for both GSM and CDMA operators in the 1800 MHz band – existing operators must thus be allocated spectrum from these bands only, for their 2G services. The idea that GSM operators be allocated spectrum from 1800 MHz, while CDMA operators be allocated spectrum from the IMT-2000 band is distortive, discriminatory, unjust and unfair and should not be considered under any circumstances.

58. While the imminent unified telecom license will allow operators to offer both 2G as well as 3G services, IMT-2000 spectrum is undoubtedly reserved for 3G services & applications and should only be used for the same.

G. OTHER IMPORTANT SUBMISSIONS

59. Re-organization of frequencies towards more contiguous bands is highly desirable because this makes the frequency blocks wider, resulting in better network planning /optimal design besides improved spectral efficiency. This process of re-organization /harmonization is already underway under the aegis of WPC and in fact contiguous spectrum has already been made available in Delhi. We fully support this ongoing process and its intentions.

60. The 1880–1900 MHz band is already earmarked and is being extensively deployed by service providers, including BSNL for the operation of Cor-DECT. NFAP 2000 and NFAP 2002 both have duly earmarked this band for micro-cellular deployment. Given the important role being played by Cor-DECT in making telecommunication available to rural communities, we recommend no change whatsoever in the current dispensation.

61. The 1880–1900 MHz band should not be paired up with 1970–1990 MHz because the latter is part of the IMT 2000 paired band, and this would render its IMT 2000 pair useless. It may also create the need for further guard bands to be introduced, thereby reducing the overall utility of the band further. Given the amount of international effort that has gone into ensuring efficient compatibility between GSM1800, DECT and IMT 2000 allocations, it would be counter-productive to introduce a sub-optimal deviation. Fragmenting and corrupting the IMT-2000 band would reduce its overall utility to operators and the resulting service and price benefits to customers.

62. Re-farming of spectrum is very important to make adequate spectrum available to fuel / drive the aggressive growth of mobile services in the country. It may be pertinent to point out that that a Group of Ministers set up late last year has already taken an in-principle decision to free up 25 MHz of additional spectrum for mobile operators over the next 3 years. It had also been reported by media, that for freeing up these bands, a sum of nearly Rs. 900 crores is expected to be made available by the Finance Ministry.

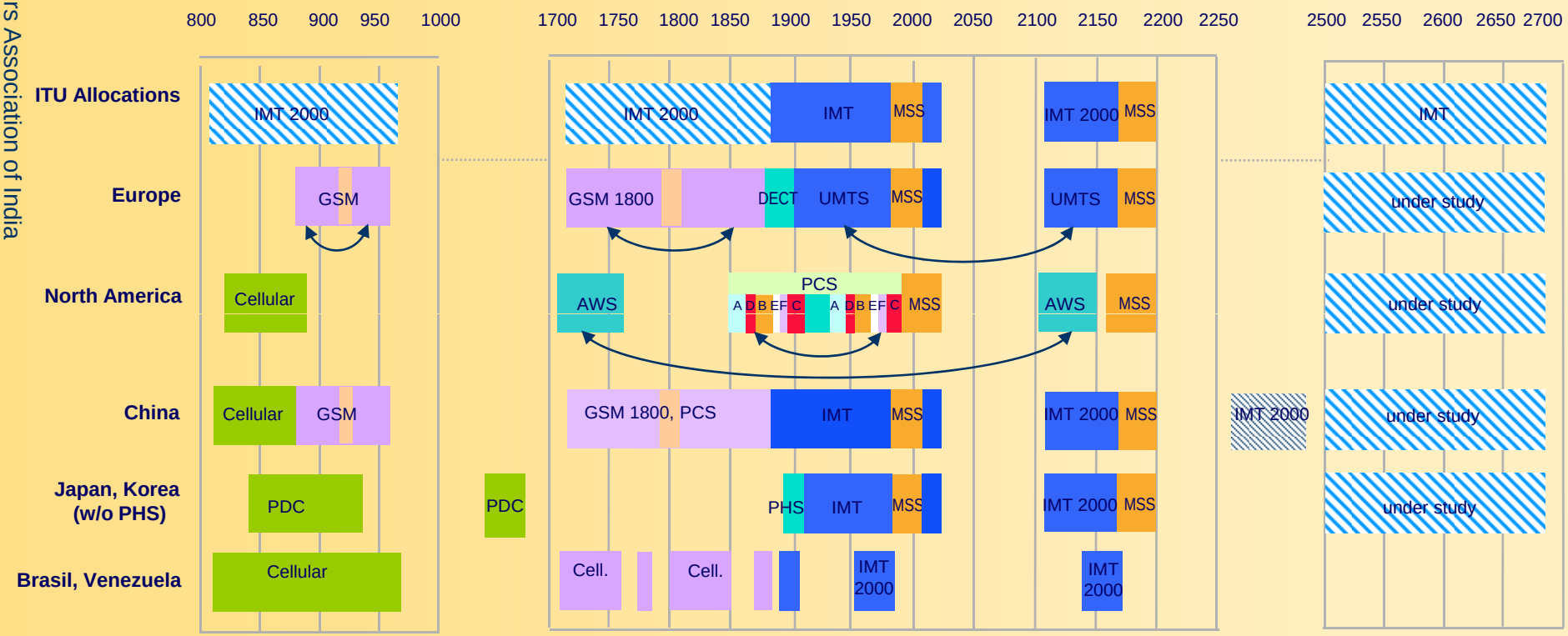
63. Users should only be refunded where they have been asked to surrender spectrum, in advance of the expiry of their licenses, or in cases where such surrender has become fait accompli as a result of a change in government policy – such as the introduction of unified access licensing. No refunds should be considered in cases where licensees have chosen to exit their businesses.

64. The amount of refund could be based upon return of entry fee pro rata for un-expired term of license / spectrum taken from the time that the license became redundant – i.e. introduction of the unified access licensing policy or at the point when the licensee is asked to surrender his spectrum.

65. We believe that it is premature to consider introducing spectrum trading in India.

66. There should be no requirement for a spectrum cap as spectrum allocated to the GSM operators has been paid for through entry fee and incremental revenue share charges. Further, this spectrum is assigned only after the operators provide full justification for each additional assignment.

Spectrum Arrangements for Mobile Telecom.



- **Allocation of systems outside dedicated bands leads to industry fragmentation**
  - **Open and interoperable standards strength the industry**
- **Harmonized spectrum is important for roaming and large economy of scale**
  - **Non-harmonised Spectrum plans cause co-ordination problems and spectrum loss**

Source : International Spectrum Seminar, December 2003, New Delhi

COAI'S RESPONSE TO
TRAI'S CONSULTATION PAPER NO. 11/2004
ON
SPECTRUM RELATED ISSUES

VOLUME – II
DETAILED SUBMISSIONS & ANNEXURES

CELLULAR OPERATORS ASSOCIATION OF INDIA

JULY 16, 2004, NEW DELHI

COAI'S RESPONSE TO THE TRAI'S CONSULTATION PAPER NO. 11/2004 ON SPECTRUM RELATED ISSUES

INTRODUCTION

1. At the outset, we would like to welcome this initiative of the Authority to look into the spectrum related issues. **Spectrum is a key resource vital for providing mobile services** and the **Government's Policy on the important issues of spectrum allocation, pricing and its efficient usage will play a crucial role in deciding the future role of the Indian wireless sector** in contributing to country's national telecom objectives.

2. We believe the primary / most important fundamental objective of the Authority should be to **maximize benefits to the entire population of potential mobile users in India** - in terms of extensive mobile service availability, low prices and good quality of service.

3. This can be achieved by prescriptive, regulated means but, in most telecoms markets around the world, Regulators seek to achieve these consumer benefits by **encouraging, introducing and facilitating fair competition among mobile operators**. Fairness means that no operator is put at a disadvantage to any other and that all the operators viable in a given market should survive and flourish. **By optimizing the level of sustainable competition in the market** (i.e. the number of independent players), **the Authority will create the best environment in which all mobile operators will compete and innovate – in terms of services availability, pricing and quality of service**.

4. **Giving any operator, or group of operators, an unfair advantage**, in any respect, over others, **risks destabilizing the market**. In this regard, we believe that **a number of options discussed in the consultation will put the GSM operators at a serious unjustified disadvantage to CDMA operators**. This imbalance would likely lead to far-reaching and adverse consequences which could include market exit and a resulting increase in market power among the remaining operators. **The resulting reduction in competition would be to the ultimate detriment of mobile users across India, and it would be irreversible**.

RESPONSES TO CONSULTATION QUESTIONS

CHAPTER 1: BACKGROUND

General Comments

1. We note from Section 1.2 on the **"Context of Recommendations,"** that the reference to the Authority was to consider the **"Efficient Utilization of Spectrum"** We believe that **this reference entails examining the efficient utilization of the respective spectrum that has been allocated to the mobile operators** for providing their mobile services This is **also the position taken by the Expert Committees on Spectrum set up by the Government on GSM and CDMA** which

have looked into the issue of optimum utilization of spectrum allocated to GSM and CDMA operators and laid down separate milestones for each standard for additional spectrum assignments.

2. We believe that the Authority has **erred in taking this reference as the mandate to make recommendations on the comparative efficiencies of the existing technologies**. This is incorrect, unjustified and unfair. The **Regulator has to maintain a technology neutral position and ensure that all regulatory decisions are aimed at ensuring free and fair competition between competing technologies.**

3. In this regard, it may also be noted that it was **only after a critical examination of all possible technology options that the Government selected GSM as the technology of choice** for introducing cellular mobile services in the country.

4. **India has benefited** from this far-seeing **decision of the Government as GSM continues to be the dominant technology, both worldwide and in India**, reaching **1.1 billion mobile consumers worldwide** and accounting for **around 75% of all digital mobile subscribers and 80% of all new additions.**

5. It is thus **not only outside the framework of reference but also incorrect and improper to now embark on a comparative analysis of two technologies** and that too, **on the basis of one single characteristic, which has led to erroneous conclusions.**

6. We believe that the in the context of the reference on 'efficient utilization of spectrum" requires the Authority to **ensure that all mobile operators, whether GSM or CDMA operators, fully and optimally utilise their allocated spectrum before being entitled to fresh assignments**. We believe that this could be ensured by **CDMA operators making network investments to achieve base station density equivalent** to **that of the GSM operators.** This will **ensure optimal utilization of allocated spectrum** and also **ensure level playing field**.

7. Furthermore, it is respectfully submitted that the **Authority may also keep in mind the provisions of the NFAP, prevalent Cellular Spectrum Use Policy & License whilst making its recommendations.**

8. In consonance with the transparent practice always adopted by the Authority, we would deeply appreciate if the **Authority could provide a copy of the actual reference made by the Government in this regard**.

CHAPTER 2: CURRENT SPECTRUM AVAILABILITY AND REQUIREMENT

General Comments

1. It is submitted that **Table 2.1** which talks about International & Indian practices in spectrum allocation for 2/2.5G mobile services **incorrectly states that the 1800 MHz band is only for** the use of the 1st, 2nd, 3rd & 4th CMSPs **(GSM**). The fact of the matter is that, **the 1800 MHz band has been earmarked for both GSM as well as CDMA operators under the Unified Access License**. This is evident from Clause 43.5(ii) of the UAS License, which provides that the spectrum to the Unified Access Services Licensee

> "shall be allocated in 824-844 MHz paired with 869-889 MHz, 890-915 MHz paired with 935-960 MHz, 1710–1785 MHz paired with 1805–1880 MHz."

A Copy of the relevant clause of the UAS License is enclosed as **Annexure [1].** Also, NFAP 2000 as well as NFAP 2002 have earmarked the 1800 MHz band for both technologies.

2. The Authority has stated in Section 2.2 "the present policy on spectrum use is technology neutral but equipment availability and the accruing economies of scale also govern choice of technology." In this regard, it is relevant to note that :

   a. When DoT announced its technology neutral policy, GSM operators had approached DoT seeking spectrum in the 800 MHz band. DoT responded to this request by stating "The cellular services are to be operated by the existing licensees in designated cellular mobile telephone service band i.e., 890-915 paired with 935-960 MHz. The **operators have been permitted to operate the Cellular Mobile Telephone Service in any technology**, **however the technology** shall be digital and **has to operate in the designated frequency band**. As such no additional frequency spectrum needs to be allocated" A Copy of the DoT Circular No. 842-309/99-VAS dated April 9, 2001 is enclosed as **Annexure [2].** It thus goes without saying that **the same principles and treatment must also apply to the CDMA operators who are now full-fledged cellular mobile service providers.**

   b. The **CDMA operators are operating under a Unified Access Service (UAS) License** which clearly stipulates the designated spectrum for UAS in the 800 MHz, 900MHz and 1800 MHz bands. Based on the principles enunciated by the Government in the above para, it is thus very clear that the **CDMA operators are technology neutral only within their designated bands of 800 MHz / 1800 MHz as per their license** and the argument of technology neutrality cannot be used to move out of their designated frequency bands.

   c. As regards equipment availability, as has been brought by us in subsequent paras, **CDMA infrastructure is adequately available in the 1800 MHz** band and **any misconceived claims that it is not 'widely' available' cannot be used to violate the tenets of license, NFAP, etc**.

   d. Whilst talking about the economies of scale, the Authority must note that **harmonized use of spectrum brings in the widest economies of scale**

leading to more affordable services, seamless roaming and better end user experience.

3. With respect to Tables 1 & 2 in Section 2.3, we would like to submit that **mixed band plan of frequency arrangements PCS 1900 with IMT-2000 WARC-92 bands for paired IMT-2000 operation does not find a place in the recommended options**. This is evident from the following:

   a. The ITU WP8F Report on spectrum for IMT-2000 had considered the possible / preferred harmonized frequency arrangements in the 806-960 MHz, 1710-2200 MHz and 2500-2690 MHz, keeping in view the approved frequency bands by WARC-92 as well as subsequently by WRC-2000 (referred to as extension bands) for interference-free IMT-2000 applications / services.

   b. The Report has indicated Options A1 & A2 as the two possible preferred frequency arrangements in the 806-960 MHz as identified for IMT-2000 (WRC-2000) with the remark that no common solution would be possible in the near and medium terms.

   c. The Report has considered paired frequency arrangements in the band 1710-2200 MHz and indicated different combinations of options B4, B5, B6 for optimized use of spectrum for paired IMT-2000 operations, based on harmonization with B1, B2, B3 basic frequency arrangements already in use by public mobile systems.

   d. B1 and B2 are fully complementary and B3 overlaps with B1 and B2 frequency arrangements.

      i. Option B4 has been indicated to optimize use of spectrum for paired IMT-2000 operations, as the option for countries having implemented B1 frequency arrangement i.e. (1920-1980 /2110-2170 MHz).

      ii. Option B5 enables maximization of the use of spectrum for paired IMT 2000 operation for such countries where Option B3 (1850-1910 / 1930-1990 MHz) is implemented and where the whole band 1710-1850 MHz is available.

      iii. Option B6 enables maximization of the use of spectrum for IMT-2000 operations for such countries where B3 is implemented and where the band 1710-1850 MHz is not available in the initial phase of deployment of IMT-2000 in this frequency band.

   e. In simple terms, the options B4, B5, B6 by ITU WP 8F indicate the preferred combination of harmonized frequency arrangement with the prevailing / current usage of the paired frequency bands B1, B2, B3 (in part or whole) for public mobile systems in the country so as to enable optimal usage of the spectrum for paired IMT-2000 operations. **In case combination of non-harmonized frequency arrangements** (i.e., other that B4, B5, B6) **are attempted to be deployed** then the **prevailing / current usage of the frequency arrangement for public mobile system in the country would get disturbed**. It may not be out of place to mention that the availability of equipment in the non-harmonized frequency arrangements is also questionable.

f. It may also be pertinent to note, **that equipment rollout based on WRC identified bands is a time consuming and an involved process**, both at the levels of ITU study groups and investments / equipment planning, etc., by the global equipment manufacturers. If past experience is any guide, like commercial availability of infrastructure equipment, based on WARC-92 identified bands for IMT-2000 operations (it has taken more than 10 years), the commercial availability of equipment based on WRC-2000 identified bands (referred as extension bands) is unlikely to emerge in the near future.

g. **Almost all countries are adopting the principles of harmonized spectrum use and are allocating spectrum as per the ITU globally harmonized bands** (WARC-92 identified) for IMT-2000. Even in cases where part of this band had been allocated to PCS 1900 (US) MHz for historical reasons, those countries are revising / re-farming their frequency allocation plans so as to be in consonance with the ITU globally harmonized bands for IMT 2000.

4. In Section 2.3, the Paper states that if we look at the Table 2, "it can be observed that IMT-2000 equipment would also be available in the 1710-1785 paired with 1805-1880 bands (B2 & B5 arrangements)". In this context, it must be pointed out that:

a. Based on ITU-R recommendations, **it took more than 10 years for the industry to come out with commercially available infrastructure for IMT-2000** applications / services in the WARC 92 identified band i.e., 1920-1980 MHz / paired with 2110-2170 MHz. As of today, **120 operators /licenses** have been awarded in **40 countries**, which have **either commercially deployed IMT-2000/FDD mode** (WCDMA) access standard (i.e., the evolution path to 3G for the GSM operators to migrate to IMT-2000. WCDMA should not be confused with CDMA 2000 which is the CDMA evolution path to 3G) **or are in different stages of deployment** / launching (37networks are already commercial with almost 6 million users; 60 networks expected to be commercial by end-2004).

b. **If any bands other than the above WARC-92 identified band**, such as the WRC-2000 identifications **are considered for IMT-2000,** then there **is absolutely no chance/ possibility of any infrastructure being commercially available in the next few years, if not more. This would delay India's move to 3G thus depriving the millions of Indian mobile users from deriving** the wealth of benefits associated with (WCDMA (GSM 3G) and CDMA) IMT-2000 products that will be available to most other mobile customers in the world.

5. Whilst the Consultation Paper has discussed the ITU methodology in Section 2.5.1 and has also suggested that stakeholders may provide any other methodology, we note that in the issues raised for Consultation, the Paper only asks for demand estimates on the ITU methodology. It neither asks stakeholders for their views on the applicability of the ITU methodology to the current scenario, nor does it give the option for demand estimation by any other method.

6. It is a matter of great concern that in Section 2.6, the **Authority appears to have erroneously presumed that the 1800 MHz band is only for the GSM operators**. This is evident from the following :

a. In Table 2.3, **when total spectrum is calculated, the 800 MHz spectrum** is **mentioned separately while 900 MHz & 1800 MHz bands are clubbed together**.

b. **In the entire Table**, for both Approachs I and Approach II, **the 1800 MHz has not been taken into account for CDMA even when spectrum is available in this band**. This is amply evident under Approach II for Non-Metros, where, despite there being a surplus of 16.4 MHz in the 1800 MHz band, the Table continues to show a deficit of 10 MHz for the CDMA operators.

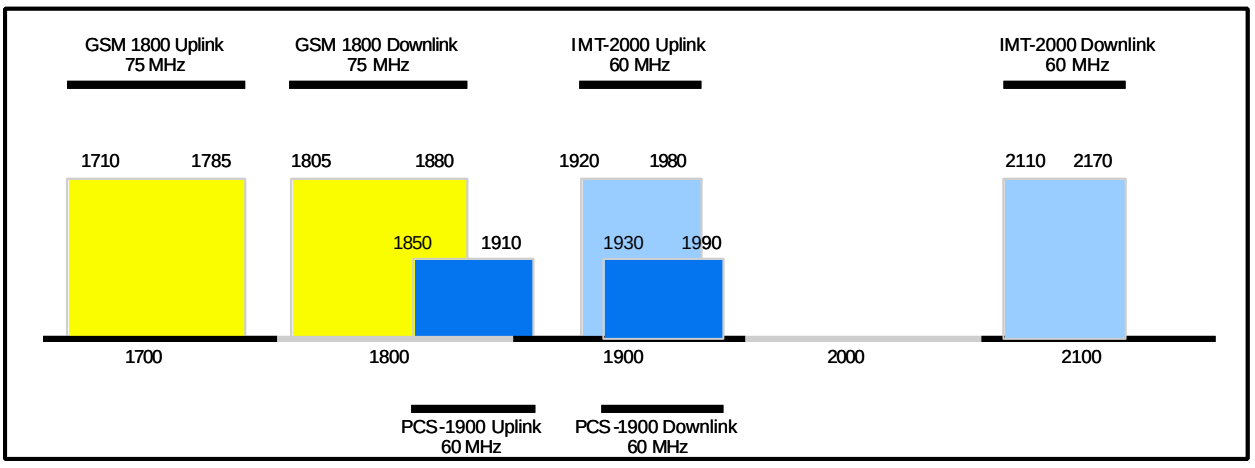
c. In Section 2.6.2, it is **stated that for CDMA there is no path available beyond 2x5 MHz (in the 800 MHz band).**

As already stated, under license, **the spectrum in the 1800 MHz band is equally available to both GSM & CDMA** and further that a total of 2x75 MHz has been earmarked for both these technologies. There is enough spectrum for both technologies and it is absolutely incorrect to say that CDMA operators have no path beyond the 5 MHz in 800 MHz.

7. The **Authority also appears to be under a misapprehension that equipment is not widely available in the 1800 MHz band**. This is incorrect. As per the information available to us**, both CDMA infrastructure** (Motorola, Lucent, Ericsson, Samsung, LG, Daewoo) **as well as handsets** (Samsung, LG, Pantech, Curitel, Sewon, Telson) **are widely available in the 1800 MHz band**. A list of vendors as per our information is enclosed as **Annexure [3].**

8. **Given the fact that adequate spectrum as well as equipment exists in the 1800 MHz band, we believe that there is absolutely no reason or justification to consider the US PCS Band for CDMA.**

9. Further, the **consideration of the US PCS band entails very serious adverse implications for the existing as well as future operations of the GSM operators.** This is because allocation of the US (PCS) band will directly reduce both the available GSM 1800MHz band as well as impair the IMT-2000 band by severe harmful interference.



10. **Allocation of any portion of the IMT-2000 WARC-92 identified band to CDMA, will block the evolution of the GSM operators to IMT-2000/3G** thus denying the

millions of Indian GSM consumers the opportunity to avail of the feature-rich experience of 3G services / applications. The Authority does not appear to have appreciated this concern.

11. Further, allocation of the US PCS band, in part or full, to the CDMA operators **will cause a very high level of interference both in the BTS as well as in the terminals**. This interference cannot be mitigated. This is because the specifications of terminals and network systems do not take into account the situation where both technologies would co-exist. As a result, two severe interference mechanisms arise:

    a. **Handsets interfering with each other.** A Single WCDMA (GSM 3G) terminal transmission can block all CDMA 1900 terminal receivers within the radius of up to 200 meters. It would not be possible to mitigate this mechanism, since the internal filters in terminals cannot reduce the interference as much as would be required. Naturally, the consumers cannot be instructed to keep a certain minimum distance from other people who are talking to a mobile phone.

    b. **Networks interfering with each other.** CDMA base station transmission blocks the WCDMA (GSM 3G) base station receiver. The downlink of the PCS 1900 MHz is adjacent (co-channel) to the uplink of the IMT-2000 paired bands i.e. the duplex directions are opposite. Thus the CDMA Base Station in PCS 1900 band would cause severe harmful interference to the receivers in the IMT-2000 systems. This would require large guard bands, large-size and complex filters, site co-ordination and increased base station density for all operators. In practise, however, the required solutions: would be too complex to build and operate; would pose severe limitations to potential site locations; would roughly double the 3G coverage build costs for all operators and would lead to large amount of waste spectrum because of guard bands. In practice the operators would not be able to execute this approach in a competitive environment. Naturally, this scenario will never happen, as the terminal interference issue prevents this scenario from happening.

12. The Authority may note that **even the current GSM networks in 900 MHz are experiencing interference from CDMA networks in the 800 MH**z band because of the allocation of part of the e-GSM band to CDMA. **Efforts at mitigating this interference have not proved effective** even though the duplex directions are the same, thereby rendering downgraded performance. The **interference in the case of PCS 1900 MHz would be far worse and more severe**, as the duplex directions are opposite.

13. **No country has deployed both PCS 1900 and IMT-2000 Core Band systems.** Taking the above aspects into consideration, no country has in parallel deployed the CDMA 1900 MHz and IMT-2000 core band systems in the same area. For example, China for a few years, used the 1900 MHz band for PHS technology but the Administration there has decided to close the system and delete the PCS-1900 band, so that systems in IMT2000 core band will able to operate. The PCS-1900 band systems already had to be removed from Mainland China areas close to Hong Kong, due to interference with Hong Kong based WCDMA (GSM 3G) services. The Authority may wish to engage in a discussion with their counterparts in China, as they have been evaluating this issue for a long time.

14. **PCS 1900 could destroy 60+60 MHz IMT-2000 Core Band, and should not be allocated.** Even if a small part of PCS-1900 band were allocated, the CDMA1900 terminals would start entering the market. This would make the introduction of WCDMA (GSM 3G) impossible without dismantling the CDMA1900 network and calling back the terminals. In short, allocation of PCS1900 could lead to a waste of full 60+60 MHz of commercially viable, technology-neutral, interference-free, harmonized IMT2000 core spectrum.

15. While the Authority has, in Section 2.6.2 noted the aspect of interference, by stating that "Prima facie there appears to be **possibility of such interference**, however, this would need further examination", it **does not appear to have grasped the magnitude / intensity of the problem and its serious adverse implications**. We believe that this is a **very serious issue and such examination** of the intensity of the interference and its adverse impact on QoS **should be completed in an open, transparent and consultative manner, BEFORE any decision is taken** that could jeopardize the future of both GSM and CDMA in the country.

16. Because of the above serious implications, **there is no such country / example where 1900 MHz band has been allocated in the same city/geographical area to a CDMA operator where GSM was already operating.**

17. For all the above reasons, we strongly disagree with the option proposed by the Authority that IMT-2000 spectrum be opened up in continuum with 2G. **This spectrum is for 3G** services and **should be preserved for the same**. Once it is opened up, it should be made available simultaneously to all existing / interested operators.

18. **Spectrum harmonization is an important aspect of spectrum efficiency in global radio communications. The Consultation Paper has not considered this aspect.** Globally harmonized common spectrum**, identified by ITU-R** increases the equipment commonality, facilitates global roaming and brings benefits of economies of scale for the consumers.

19. Implementation /use of ITU-R globally harmonized common spectrum, WARC-92 identified, thus leads to:

    a. Interference-free operations

    b. Optimal utilization of spectrum (no wastage by guard bands etc),

    c. **Facilitation of Global roaming**

    d. **Availing of the benefits of the economies of scale of globally available standard equipment, etc**

20. Almost all countries are adopting the principles of harmonized spectrum use and are allocating spectrum as per the ITU globally harmonized bands **(WARC-92 identified) for IMT-2000.** This is evident from the **Chart** (Next Page) **that clearly brings out the fact that** whilst ITU has identified bands for IMT-2000 in both WARC-92 as well as WRC 2000, **all the countries that have gone in for IMT-2000 have done so in the WARC-92 identified bands.**

21. **In cases where part of this band had been allocated to PCS 1900 (US) MHz for historical reasons, those countries are** revising / re-farming their frequency allocation plans so as to be in consonance with the ITU globally harmonized bands for IMT 2000**.**

22. It would indeed be a retrograde measure to consider **allocation of PCS 1900 MHZ (US) band,** knowing fully well the **serious adverse implications involved** and also the fact that this would be **completely contrary to ITU recommended globally harmonized bands and trends worldwide for IMT-2000 applications / services.**

23. **We would also like to draw the attention of the Authority to the recent recommendations made by the ITU Regional Working Group on Private Sector Issues**, which met on April 26-27 in New Delhi. The recommendations of the Group, were **consensually agreed between all stakeholders,** including representatives from **several Asia Pac and other countries** as **also representatives of DoT, WPC, TEC, ABTO and COAI, are reproduced** as under:

    a. "Harmonized frequency allocation is essential for facilitating global roaming, economies of scale, wide competitions and benefits to the end-users.

    b. Consistency in identifying global spectrum for specified services also provides regulatory certainty for operators, investors, manufacturers and administrators and facilitates development of global standards.

c. Long-term spectrum plans should consider ITU-R globally harmonized spectrum use as well as the technological evolution paths of different wireless systems in a given market. The adequate accommodation of these requirements in national spectrum allocation should aim to give operators certainty in their long-term plans and strategies.

d. ITU has identified certain bands for the IMT 2000 / 3G applications, without precluding the use of these bands for other wireless applications. It was pointed out by the ITU expert that the thrust of the ITU Recommendations was achieving global harmonization of spectrum use and that the same should be implemented."

A copy of the recommendations of the Regional Working Group is enclosed as **Annexure-[4]**

24. **It is important for** India to integrate itself with the global community and continue to safeguard the ITU-R globally harmonized, frequency band (**as already earmarked in NFAP-2000 and NFAP-2002)** from impairment for subsequent use as well as avoid its fragmentation. **This would be in line with other countries worldwide including Japan, Korea, China, Brazil, etc.**

25. A copy of our detailed submission to WPC for not considering the allocation of the US PCS band for CDMA, is enclosed separately as **Volume III.** A copy of the submission made by the Global Mobile Suppliers Association (GSA) to the WPC on the dangers and risks associated with the allocation of the US (PCS) band to CDMA operators is enclosed as **Annexure-[5].**

(i) Should the 450 MHz or any other band be utilised particularly to meet the spectrum requirement of service providers using CDMA technology?

The Authority has rightly observed that 450 MHz spectrum is well-suited for rural applications. However, it should be technology neutral, not predetermined for any technology.

As regards utilization of "any other band", it must first please be noted that under license, 2x20 MHz in the 800 MHz band has been allocated to CDMA operators and upto 2x75 MHz has been earmarked in the 1800 MHz band for both GSM as well as CDMA operators. We believe that this is more than sufficient to meet the spectrum requirements of the CDMA operators for their 2G services.

However, if at all, "any other band" needs to be considered, it is important to ensure that the allocation is are as per ITU-recommended globally harmonised bands for digital cellular systems and that the band should be equally available to both GSM as well as CDMA operators. This will ensure India's integration with the rest of the world and deliver to mobile subscribers significant benefits of lower tariffs resulting from economies of scale, seamless roaming etc. This will also ensure level playing field.

(ii) The consultation paper has discussed ITU method for assessment of spectrum requirement. Based upon the methodology submit your requirement of spectrum for next 5 years. While calculating the required spectrum, please give various assumptions and its basis.

A. Spectrum Requirement for 2G/2G+ Services

The spectrum requirements for GSM operators have been extensively examined / considered by the Government and the decision of the Government has been taken as recently as July 29, 2003, whereunder a roadmap of upto 2x15MHz per GSM operator has been laid down, to be assigned as below.

Subscriber Base	Spectrum
Initial allocation	4.4 MHz/ 6.2 MHZ
Upon reaching 5 lakh subscribers	8 MHz
Upon reaching 8 lakh subscribers	10 MHz
Upon reaching 12 lakh subscribers	Upto 15 MHZ (in chunks of 2+2 MHz)

This spectrum use policy was finalised after receiving inputs from an Expert Committee set up by the DoT on January 28, 2003. The terms of reference of the Committee were as below :

To examine the current utilization of assigned bandwidth by various cellular operators;

To examine network design practices followed by various cellular operators from the point of view of optimal utilisation of assigned bandwidth;

To carry out comparison with internationally used norms and practices in this regard.

The Committee was comprised of Adviser (Technology), Wireless Adviser, Senior DDG (VAS), DDG(V), TEC and representatives from COAI and ABTO.

The Expert Committee considered all the above aspects and after elaborate network testing, subscriber growth forecasts, deliberations / discussions at various levels, intensive consultations with the stakeholders (including the CDMA operators), laid down a roadmap for allocation of 2x15 MHz spectrum per GSM operator. The allocation of additional spectrum was linked to pre-determined milestones of number of subscribers to demonstrate that the operators had adequately utilised the spectrum so far released to them. A copy of the Report of the Committee is enclosed as Annexure-[6].

This spectrum use policy has been duly approved all competent authorities and subsequent Ministerial Orders have also being issued by the Ministry of Communications (WPC Wing) vide Letter No. L-14047/06/2004-NTG dated April 15, 2004 for incremental revenue share spectrum charges for allocations upto 2x15 MHz. A copy of the Ministry's Order is enclosed as Annexure-[7].

This policy has since been implemented and the GSM operators have already been allocated 10 MHz spectrum in the metros of Delhi & Mumbai on the basis of this Policy (likely to go up to 12 MHz shortly) and are already making payments on the higher revenue share basis.

It is submitted that the above spectrum use policy should now be deemed to be part and parcel of the GSM operators' licence and not be altered to the detriment of the service providers.

It is further submitted that a similar exercise has also been undertaken for the CDMA operators. The Expert Committee comprised of Member (Technology), Wireless Adviser, Senior DDG (VAS), Senior DDG(TEC), JWA(N), DDG(BS), DDG(M) and representatives from COAI and ABTO.

We understand from newspaper reports that the exercise has already been completed and that the Committee has recommended the following spectrum allocation formula for the CDMA operators:

Number of Subscribers (in lakhs)

Spectrum Service Area	2.5 MHz	3.75MHz	5 MHz
Metro	Initial Allocation	4	8
A	Initial Allocation	7	14
B	Initial Allocation	5	5
C	Initial Allocation	4	8

A copy of the media report is enclosed as Annexure-[8].

In the light of the above, we believe that the issue of spectrum requirement has been fully addressed by the Licensor / Policy maker who has, most recently, arrived at the above conclusions after extensive deliberations by an Expert Technical Committee which considered all techo-economic parameters, international practices, optimal utilisation of spectrum, future growth forecasts, etc and after participation of all stakeholders, arrived at the above formulae for additional allocation of spectrum.

However, we believe that it is important for the Committee as well as the Authority should ensure that both the GSM and CDMA operators fully and optimally utilise their existing spectrum allocations before being entitled to fresh assignments. This could be ensured the CDMA operators making network investments to achieve base station density equivalent to that of the GSM operators. This will ensure that the operators fully exploit the spectrum allocated to them. This will also ensure level playing field.

B. Spectrum Requirement for 3G Services

We believe that the spectrum for 3G services should be as per the WARC–92 identified Core Band of 1920-1980 MHz paired with 2110 to 2170 MHz. This band is truly technology neutral and will ensure the evolution of both GSM as well as CDMA operators to IMT-2000 in the most spectrally efficient, harmonized, interference-free manner. It may be noted that this band has already been allocated to both GSM and CDMA even in countries such as South Korea and Japan, which are essentially CDMA incumbent countries.

It is also submitted that the first round of 3G spectrum assignments from this Core Band should be made *simultaneously* to all existing/interested operators – GSM and CDMA. It may be noted that several existing GSM operators have already applied for this spectrum.

c. International best practice, for Asia and Europe, indicate that 2 x 15 MHz should be reserved for each GSM operator. A copy of international practices in spectrum allocation for 3G/IMT-2000 license is enclosed as Annexure-[9].

(iii) Whether IMT 2000 band should be expanded to cover whole or part of 1710 – 1785 MHz band paired with 1805 – 1880 MHz?

No. At this stage, the priority should be for the Authority to focus on the core IMT-2000 / WARC 92 identified band (i.e. the 1900 – 2170 MHz band) that was identified in WARC 92. This has already been allocated and licensed in more than a couple of dozen countries worldwide. It is the Core IMT-2000 Band that will establish the underlying commonality and synergy among all IMT-2000 countries worldwide, and for which a wide variety of infrastructure and terminal equipment are already available.

Further bands for IMT-2000 are expected to be introduced in the future, but none will have the same level of international harmonisation as the 1900 – 2170 MHz band - this Core Band is therefore the fundamental plank in the global IMT-2000 initiative.

The issue of expansion of the IMT-2000 band should only be considered once the existing band allocations for IMT-2000 (WARC-92 identified and catered for in NFAP) have been fully allocated for 3G services.

Furthermore, at present, the 1700/1800 MHz band is earmarked for 2/2G+ services for both GSM and CDMA operators and will be required to meet the increased spectrum assignments to existing GSM & CDMA operators for their 2/2G+ services. Based on current growth forecasts, we believe that the earmarked 2x75 MHz spectrum in this band would be fully required to meet the demand for spectrum for 2/2G+ services over the next few years. The TRAI should therefore ensure that the 1700/1800 MHz band is preserved, for the meantime, for 2G use only.

It should be noted that, based on ITU-R recommendations, it took more than 10 years for the global telecom industry to come up with commercially available infrastructure for IMT-2000 applications and services in the WARC 92 identified band (i.e. 1920-1980 MHz / paired with 2110-2170 MHz). There will necessarily be a delay between allocating a new band in India for IMT-2000 and the availability of corresponding equipment, and even then, it will fail to benefit from economies of scale available in the core IMT-2000 band.

Furthermore, 3G spectrum must be made available simultaneously to all existing, interested GSM & CDMA operators and only for 3G services – 3G spectrum should not be made available pre-emptively for 2G services, or only to CDMA operators for 3G services.

Expeditious introduction of 3G is important and relevant for India as this will deliver maximum benefits to mobile customers in India, in terms of higher voice capacity, data-speeds, increased service offerings, etc., common with those other countries where the band has already been assigned, and delivering associated roaming benefits and economies of scale. The Government should accelerate the release of the core IMT-2000 band from other historical users.

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

No. IMT-2000 spectrum is clearly earmarked for 3G applications and should be considered and dealt with separately from 2G. IMT 2000 spectrum should not be considered as an extension of 2G mobile services. To the best of our knowledge, there is no country in the world that has treated 3G as a continuum of 2G.

3G allows operators to introduce a range of high-speed services that are not possible over 2G networks. The IMT-2000 band has a unique role to play in facilitating these new services – by both WCDMA (GSM 3G) and CDMA operators - and, as in most other countries around

the world, should be preserved for this role until such time as 3G services are opened up in India. The TRAI should resist any temptation to use any part of the IMT-2000 band for non-3G services, because this would severely reduce the overall utility of the band, and the scope for 3G services in particular in India. Such an action would unfairly penalise GSM operators by denying them an upgrade path while CDMA operators are provided with a premature 3G upgrade path.

It should be noted that 2x75 MHz has been earmarked for both GSM and CDMA operators in the 1800 MHz band – defined within licences as well as the National Frequency Allocation Plan (NFAP). The idea that GSM operators be allocated spectrum from 1800 MHz, while CDMA operators be allocated spectrum from the IMT-2000 band is distortive, discriminatory, unjust and unfair and should not be considered under any circumstances.

(v) Reorganisation of spot frequencies allotted to various service providers so as to ensure the availability of contiguous frequency band is desirable feature for efficient utilisation of spectrum. Please suggest the ways and means to achieve it.

a. We agree that **reorganisation of frequencies towards more contiguous bands is highly desirabl**e because this makes the frequency blocks wider, resulting in **better network planning /optimal design besides improved spectral efficiency.**

b. We would like to point out that this **process of reorganisation /harmonization is already underway under the aegis of WPC** and in fact contiguous spectrum has already been made available in Delhi.

c. We fully support this ongoing process and its intentions.

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

a. **The 1880–1900 MHz band should not be paired up with 1970–1990 MHz because the latter is part of the IMT 2000 paired band, and this would render its IMT 2000 pair useless / IMT-2000 operations non-functional. Pairing this band with 1970-1990 MHz would also create a totally new band that is not in line with ITU-R, M1036.** It may also create the need for further guard bands to be introduced, thereby reducing the overall utility of the band further. **Given the amount of international effort that has gone into ensuring efficient compatibility between GSM1800, DECT and IMT 2000 allocations, it would be counter-productive to introduce a sub-optimal deviation**. Fragmenting and corrupting the IMT-2000 band would reduce its overall utility to operators and the resulting service and price benefits to customers.

b. Furthermore, **the 1880–1900 MHz band is already earmarked and is being extensively deployed by service providers, including BSNL for the operation of Cor-DECT**. NFAP 2000 and NFAP 2002 both have duly earmarked this band for micro-cellular deployment. Given the important role being played by Cor-DECT in making telecommunication available to rural communities, we recommend no change whatsoever in the current dispensation.

c. DECT has distinct advantages in this regard. Each system is self-organising (requiring no individual spectrum assignment, and allowing public and private residential systems to co-exist happily) and it is focussed on the delivery of cheap

fixed telephone services. Equipment is readily available and it has been proven in other countries in the region (e.g. Nepal). Above all, it is a true WLL solution, making a genuine contribution to rural tele-density, rather than providing covert entry into the mobile market.

d. In addition, DECT technology has seen phenomenal success in the residential cordless telephone market. There are now estimated to be more than 250 million terminals worldwide with annual shipments of around 30 million units[1]. Although the majority of these are in Western Europe, a growing proportion of around 15% are in other world markets. These terminals may be easily imported and used in India. Any consideration of allocating the 1880-1900 MHz band were allocated for mobile use, will require clearing these unlicensed users from the band to prevent interference. This would be an unrealistic task given the ease with which equipment can enter the country.

[1] Data on DECT cumulative sales and annual shipments was obtained from 2003/2004 press releases from the DECT Forum (www.dect.org)

CHAPTER 3: TECHNICAL EFFICIENCY OF SPECTRUM UTILISATION

General Comments

1. At the outset, we would like to reiterate that as per the **"Context of Recommendations,"** the reference to the Authority was to consider the **"Efficient Utilization of Spectrum"**

    a. We believe that this **reference entails examining the efficient utilization of the respective spectrum that has been allocated to the mobile operators** for providing their mobile services This is **also the position taken by the Expert Committees on Spectrum set up by the Government on GSM and CDMA** which have looked into the issue of optimum utilization of spectrum allocated to GSM and CDMA operators and laid down separate milestones for each standard for additional spectrum assignments.

    b. We believe that the **Authority has erred in taking this reference as the mandate to make recommendations on the comparative efficiencies of the existing technologies**. This is incorrect, unjustified and unfair. The Regulator has to maintain a technology neutral position and ensure that all regulatory decisions are aimed at ensuring free and fair competition between competing technologies.

    c. In this regard, it may also be noted that it was **only after a critical examination of all possible technology options that the Government selected GSM as the technology of choice** for introducing cellular mobile services in the country. **India has benefited from this far-seeing decision** of the Government as **GSM continues to be the dominant technology, both worldwide and in India**, reaching over **1.1 Billion mobile subscribers** worldwide and **accounting for around 75% of all digital mobile subscribers** and **80% of all new additions**.

    d. It is thus not only **outside the framework of reference but also incorrect and improper** to now **embark on a comparative analysis of two technologies based on one single characteristic**, which has **led to erroneous conclusions**. Spectral characteristics of a technology is only one of the factors – it cannot be chosen the basis for any policy / regulatory decision to decide in favour of one technology as against the other. The erroneous conclusions in the Consultation Paper are tantamount to **discriminating against the GSM operators who are the pioneers in this field and have invested heavily in the best technology still dominating the world mobility market .to provide world-class nationwide cellular mobile services in India**

    e. We believe that the reference on 'efficient utilization of spectrum" requires the Authority to **ensure that all mobile operators, whether GSM or CDMA operators, fully and optimally utilise their allocated spectrum before being entitled to fresh assignments**. We believe that this could be ensured by **the CDMA operators making network investments to achieve a base station density equivalent to that of the GSM operators. This will ensure optimal utilization of spectrum and** also **ensure level playing field.**

2. Further, we strongly disagree with the various statements made in the Consultation Paper claiming that CDMA is a 'more efficient' technology than GSM.

a. It is submitted that **we do not agree with the observations in** the Consultation Paper that the 'most efficient' available technology is CDMA and **that GSM is the 'second best' technology**. In any comparison, the efficiency or otherwise of any technology will depend on the basic assumptions and the specific situation taken into consideration.

b. Secondly, **in an environment where different technologies co-exist in an open market for providing the same service, we believe that it is unjust and unfair to talk about** 'superior' and 'inferior' technologies. It is submitted that the ultimate advantages / benefits of a technology is the result of a summation of several complex attributes. In the case of mobile services, it is the result of an **inter-play of aspects such as seamless connectivity, interoperability, roaming, cost-efficiencies resulting from economies of scale, richness of services, user experience, etc**. In any event, as we have already stated, we do not believe that this is the context in which the recommendations have been made.

c. The inaccuracy of **the misleading conclusions drawn in the Consultation Paper, can be seen from the market scenario and the ground realities**. If CDMA was the best technology, then why do majority of the world mobile users still prefer GSM?? It is a well known fact that :

- GSM is the most widely used digital technology in the world with over 1.1 billion mobile users being on GSM
- GSM networks / services are available in 207 countries
- there are 616 GSM Networks Worldwide serving 1.1 Billion Users / subscribers
- Around 75% of the world's digital mobile subscribers are on GSM
- 80% of all new mobile subscribers are on GSM
- 99.8% of the world's population lives in jurisdictions, which have licensed GSM.

d. Further, in the case of 25 top data operators, recent analysis by EMC has indicated that :

- 22 use GSM/ GPRS/ EDGE/ WCDMA (GSM 3G) platform
- 2 use PDC/ WCDMA (GSM 3G) platform
- 1 uses CDMA platform.

e. We believe that it would be **difficult, if not impossible for anybody to categorically conclude on such a globally controversial subject** as to which technology is more 'efficient'. We believe that it would **be best to leave**

the decision to market forces to determine which technology delivers greater value to customers.

3. We would also like to point out **the serious implications and the risks associated with some of the choices discussed** in the consultation. We are convinced that **a number of options discussed in the consultation will put the GSM operators at a serious unjustified disadvantage to CDMA operators**. This imbalance would likely lead to far-reaching and adverse consequences which could include market exit and a resulting increase in market power amongst the remaining operators. **The resulting reduction in competition would be to the ultimate detriment of mobile users across India, and it would be irreversible**.

(vii) Please offer your comments on the methodology outlined in this Chapter for determining the efficient utilisation of spectrum. Also provide your comments, if any, on the assumptions made.

a. It is **most respectfully submitted that the methodology and assumptions of the Authority** on the technical efficiency of spectrum utilisation **are incorrect as well discriminatory and biased against the GSM in**dustry for the reasons outlined below:

A. Network Architecture

(i) While for GSM, the Consultation Paper has considered a multi-layered architecture to get higher erlangs / MHz/sq. km, no such multi-layered architecture has been considered for the CDMA operators.

(ii) Technically speaking, a multi-layered architecture is a deployment issue (depending upon availability of spectrum) & not a technology issue. There is nothing that stops CDMA operators from putting additional sites in hotspots / in-buildings, etc.

B. Micro/Pico Sites

(i) The deployment of micro / pico sites is directly related to capacity requirements versus spectrum availability and as such considering the same only for GSM is discriminatory and unjustified.

(ii) Indian CDMA operators have not even deployed equal density of macro sites let alone adequate micro / pico sites in their networks. On the other hand, the majority of GSM operators have had to resort to deploying micro / pico sites due to inadequate availability of spectrum.

(iii) Indian GSM operators are already using a variety of advanced techniques for optimal utilization of spectrum including reduced antenna heights, much lower power output to cater to very short inter-site distances, frequency hopping, discontinuous transmission, dynamic power control, etc. The same cannot be said to be true for the Indian CDMA operators.

(iv) To the best of our knowledge, the 9-cell cluster used by the TRAI for GSM, is neither practicable nor possible and therefore any results derived from this assumption are incorrect.

C. Number of Sites

(i) It is strange that the Consultation Paper has cited international practice of only 2-3 sites per sq km. and a maximum packing density of only 5-sites/sq km. for CDMA. This is misleading and incorrect. **The CDMA technology does not put any restriction on the number of sites /sq km. and the constraints for restricting the number of sites in any given footprint are the same for both GSM and CDMA**. There are innumerable examples in GSM, both in India and abroad, where the operators do not cross 2-3 sites /sq km. Why then, has the Paper considered this only for CDMA.

b. Since the above calculations are based on flawed assumptions, we are not in agreement with the end-results tabled by the Authority.

c. On the basis of these flawed assumptions, the Consultation Paper comes to a capacity of 30 erlangs /MHz /sq km. for GSM, and then surprisingly cites a capacity in excess of 100 erlangs / MHz / sq km based for an isolated unique case of London, that too, in an area of only 0.49 kms. It may first be noted that the average spectrum available to the London GSM operators is 2x 26.3 MHz per operator (Vodafone - 2x22.4 MHZ; BT Cellnet - 2x22.6 MHZ; One2One - 2x30 MHz and Orange - 2x30 MHz) and that the London ARPUs are believed to be 45 times higher than the ARPUs of less than USD 10 in India. This isolated example cannot be used as the basis to derive any meaningful conclusions on the "spectrum efficiency" for GSM.

d. It is pertinent to note that the calculations used for CDMA 1x networks under Section 3.2.2.1.2. are incorrect as the division factor should have been 5 (MHz) and not 6 for 4 carriers. If the correct factor of 5 is used, then the capacity derived per sq km comes to 60X number of sites. As we already pointed out the number of sites is independent of technology (CDMA /GSM) and this fact must be taken into account while examining the spectrum needs.

e. The Authority has also erred in choosing to dwell on the data requirements of CDMA operators while no such distinction has been made in the case of GSM operators. The background to this is that the CDMA operators have sought additional spectrum for data only services. It may be noted that TEC while evaluating the GSM request for additional spectrum, considered only traffic handling capacity (35 milli erlang per subscriber) within the allocated spectrum and it was left to the operator to use that spectrum for any type of service – voice or data or both. It would be unjust and unfair to adopt a discriminatory approach between CDMA and GSM operators and consider spectrum allocation for CDMA operators to provide data only services. In fact, it may also kindly be noted that as of today, CDMA operators are already providing both voice and data services within the existing allocated spectrum in exactly the same way as is being provided by the GSM operators.

f. With respect to the analysis presented in the Consultation Paper, we would like to submit the following :

(i) **The spectral efficiency of GSM networks is far higher in markets where operators have an adequate assignment of spectrum.** The table below illustrates that, increasing the allocations of spectrum to a GSM operator from 5 MHz to 11 MHz increases the Erlang capacity by a phenomenal 170%.

Spectrum (MHzx2)	**5**	**6**	**7**	**8**	**9**	**10**	**11**
Number of Carriers	25	30	35	40	45	50	55
Carriers / Sector (Reuse of 9)	2.8	3.3	3.9	4.4	5	5.6	6.1
BCCH Channels	2	2	2	3	3	3	4
TCH trunks per sector	20	25	29	33	37	41	45
Erlangs /Sector(1% GOS)	13.2	17.5	21	24.6	28.3	31.9	35.6
Cumulative Increase in Spectrum		**20%**	**40%**	**60%**	**80%**	**100%**	**120%**
Cumulative increase in Erlangs		**33%**	**59%**	**86%**	**114%**	**142%**	**170%**

(ii) As is evident from above, **GSM has a non-linearity characteristic in the B Erlang table, which can be exploited at optimal levels of spectrum allocation.** In this regard, we would like to suggest that the Authority may consider that **as far as possible, wherever spectrum is available and can be coordinated, it may be made available to the GSM operators without linking it to subscriber numbers**. The advantages of optimal allocation have been amply demonstrated in the above Table.

g. **The consultation gives surprisingly little thought to the scope to increase CDMA network capacity** through, for example, equivalent number of sites, in-building solutions, outdoor micro-sites, cell layering, pico-cells and other advanced software/hardware techniques. Furthermore, the assumption that CDMA networks are highly restricted in the degree to which they can cell-split compared to GSM is completely unfounded, to our knowledge. The analysis is wholly inadequate if it was hoped that it would support or justify the claims by CDMA operators that they need more spectrum. As the **Authority has itself noted in Section 3.2.2.7 that the CDMA networks "were not found to be congested at the current traffic levels." We believe that CDMA operators too, should be required to fully exploit their allocated spectrum by having base station density equivalent to that of the GSM operators. This will ensure that they gain the full utility of the spectrum allocated to them** and will **also ensure level playing field.**

h. In the light of the above, we respectfully submit that the primary objective of the Authority should be:

(i) To **encourage and ensure that operators make the most efficient use of allocated spectrum given their technology choice, through full deployment of a equivalent dense base station infrastructure**

(ii) To **promote the early availability of new spectrum to facilitate operators in their evolution to more modern and efficient radio standards**

(viii) Please provide your perception of the likely use of data services on cellular mobile systems and its likely impact on the required spectrum including the timeframe when such requirements would develop?

We would suggest that the likely use of data services should be considered separately for 2G /2G+ and 3G services.

A. 2G/2G+

a. Data usage in India, as elsewhere in the world, is growing rapidly. As of today, the data traffic in India is 3% of the total traffic and it is expected to grow to 5% by the year 2005 and 7% to 9% by the year 2006 – 2007.

b. When calculating spectrum needs, the TEC had assumed 35 mErlang per subscriber - for voice and data. We agree with the view that, with time, data usage is likely to increase and as such we would support the usage per subscriber increasing from 35 to 40 mErlangs per subscriber, or even higher.

c. It should be noted, of course, that **both GSM and CDMA networks already provide data services. In the interests of equality and fairness, therefore, there should be no separate spectrum calculations or allocations for data-only services**.

B. 3G

a. As regards 3G, **the Government must first make adequate 3G spectrum available equally and simultaneously to all existing, interested mobile operators**.

b. Regardless of demand for 3G services, **important lessons can be learnt from precedents in the dozens of countries where WCDMA (GSM 3G) has already been licensed, that generally a minimum of 2 x 15 MHz has been assigned to individual WCDMA (GSM 3G) operators to allow them to construct effective next-generation networks**.

CHAPTER 4: SPECTRUM PRICING

General Comments

1. At the outset, we would like to submit that **any discussion on the issue of spectrum pricing, must take into account the overall objective of ensuring high quality and affordable mobile services to consumers and the achievement of national tele-density objectives.**

2. **Spectral characteristics is only one of the factors** that determine the overall benefits / advantages of a technology **-** we are sure that **it is nobody's case that this be chosen the basis for putting in place a pricing mechanism that favours one technology over the other**. As already pointed out, this is not the mandate under the consultation.

3. It is also submitted, in an environment where different technologies exist for providing the same service, the Regulator cannot be seen to be promoting one technology over another. The Authority must maintain a technology neutral position and ensure that all regulatory decisions are aimed at ensuring free and fair competition between competing technologies.

4. **Any pricing mechanism recommended by the Authority must also take cognisance of the existing Spectrum Use Policy** both **in respect of spectrum allocation and pricing and ensure that the operators are no-worse off in the new environment. In this context we would believe that both Approach I and Approach II in the Consultation are inappropriate as they do not take into account the current Spectrum Use Policy as already in force and implemented.**

5. We believe that the **current principle of revenue share should be continued** with as it is **fair, simple, transparent and easy to administer** and it **directly connects the price of the spectrum to the value of commercial activities that use it.** Furthermore, this regime **also ensures the efficient use of spectrum** as **additional spectrum is allocated at an incremental charge and only after reaching pre-defined subscriber milestones.** The **present regime is, in fact, a form of Administered Incentive Pricing (AIP),** which has been **customized by the Government to suit the Indian environment.** This regime only needs to be fine-tuned in order to rationalise the present very high level of charges.

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

a. **No. We are in favour on continuing with the current method of determining annual spectrum usage charges on a revenue share basis,** as we believe that this method connects the price of the spectrum to the value of commercial activities that use it whilst ensuring efficient utilization of this resource.

b. Our **preferred approach would be that spectrum usage charges should be sufficient to cover only the costs of administration and regulation** (**recovered on a revenue share basis from all operators**).

c. However, **to ensure efficient utilization of this resource, the principle of incremental revenue share for additional spectrum may be continued.** However, the **overall bar needs to be lowered, the incremental charges should be modest**

(as the Government will anyways gain from higher revenues) and **there must be a cap prescribed on the maximum spectrum usage charges**.

d. This is because **in a highly competitive and price sensitive market like India, operators do not have the freedom to generate super-profits**, and therefore **higher tax is simply passed on to customers** (in the medium term, if not in the short term) in the form of higher prices or lower quality of service. This runs counter to the national policy and regulatory objective of making mobile telephony services much more widely available across India and thereby growing tele-density.

e. Also, **economic research[2] has shown that it is more efficient for a Government to tax final goods (revenues) rather than intermediate goods**. In this context, spectrum is an intermediate good, and therefore imposing a tax on it is a poor long-term policy.

f. **We believe that since** the Government already has a **well-established "rationing" mechanism for ensuring efficient use of spectrum**, i.e. by withholding additional spectrum assignments from operators until they have accumulated a prescribed subscriber base, there is **no need to use spectrum pricing as a method to discourage the inefficient use of spectrum**. The only effect of this will be **to increase costs to operators and prices to customers**. It is submitted that the Authority may consider further evolving the rationing mechanism to ensure adequate/ optimal exploitation of existing spectrum assignments, and use this as the primary means of triggering the award of further assignments. This would be the optimal and only necessary means of achieving the underlying policy and regulatory objectives.

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

a. **With respect to ongoing spectrum costs, our preferred approach is that spectrum charges should recover purely the costs of spectrum management**, in parallel with fine-tuning the current rationing approach to reducing the cost burden in end-users.

b. An exercise done by the Authority many years earlier had concluded that the costs of administration & regulation for the Authority were around 0.18% of revenues. We believe that the costs for spectrum management would be of the same order or less. Given the huge growth in the telecom sector and the resultant revenues, it is clear that this percentage would have reduced significantly.

c. In this context, we understand that, **in China, the Government followed the policy of minimal tax/levy on the telecom sector until the industry reached critical mass.** License fees were NIL. Spectrum charges were a low fixed amount (15 Million RMb on an Operating Revenue of 64 Billion RMB in Year 2000 amounting to around 0.02% of revenues). It was only when the sector reached critical mass two years ago, with around 165 million mobile subscribers, that the spectrum charges were increased to 15 Million RMb per MHz in July 2002 which given the healthy growth of subscribers / revenues would now be around 0.04% of revenue. In fact, as reported by Reuters in May 2002 that

[2] P Diamond and J Mirrlees, "Optimal taxation and public production 1: Production efficiency and 2: Tax rules", American Economic Review (1971), volume 61, 8-27 and 261-78

- China Unicom announced that the new terms, effective from 1 July 2002, would cost it US$149m over 5 years, and

- China Mobile that it would cost it US$124m over 3 years. Thus even if the market were flat (161.5m customers then), that would equate to US$70m per annum or less than US50c per customers per annum - great value! **This would seem to be a good example to follow, and one that would result in maximum benefit to India's mobile consumers**.

d. Thus keeping in mind the need to aggressively accelerate national tele-density balanced with the need to address legacy aspects and the need to ensure efficient utilization of spectrum **it is suggested that the overall cap for spectrum charges be set at 2% of revenues for spectrum allocations up to 2x15MHz per operator. Within this overall cap of 2%, the Authority may adopt a stepped approach of say increments of 0.2 or 0.25%,** for increased levels of spectrum allocation.

e. On the option of Administered Incentive Pricing (AIP), we would like to submit that **there is already a well-established form of AIP that has been customized for the Indian environment;** whereunder additional spectrum is assigned only after demonstrating optimal utilization of existing allocations. This regime has been finalized by the Government as recently as August 2003 after extensive and elaborate consultations of all relevant aspects including optimal utilization, international practices, etc. This **regime meets / fulfils all the important objectives enunciated by the Authority for a spectrum pricing policy** :

   i. It **promotes spectrum efficiency** as spectrum is allocated only after full justification of existing assignments.

   ii. It is **simple, transparent & easy to administer**.

   iii. It will **recover the costs of spectrum management.**

   iv. It will **promote competition**.

f. However, the **version of AIP proposed in the Consultation Paper**, **is not acceptable** to us for the following reasons :

   i. Contrary to the statement in the Paper that "AIP is not intended to favour any other particular technology" the version of AIP proposed by the Authority is clearly based on a pre-determined conclusion that CDMA is the "most efficient technology" and that GSM is the "second best technology" We strongly disagree with this statement and we would also like to submit that it clearly establishes that the **version of AIP proposed is not technology neutral**.

   ii. The Paper further states that fees should be set at a level that will ensure the efficient use of spectrum. It is submitted that **GSM operators are already employing a variety of advanced techniques to ensure optimal utilization of their allocated spectrum.** The table below shows that, compared to other GSM networks in key cities in Asia, GSM operators in India are operating at efficiency levels of nearly twice comparable networks.

City	Operator	Spectrum (MHz)	Traffic (Erlangs)	Geographical Area (sq. kms)	Spectrum Efficiency

Hong Kong	Hutch	17.5 MHz (12.5 + 5 MHz)	18,900 (540,000 subs)	1078	1
Shanghai	China Mobile	29 MHz (19 + 10 MHz)	225,000 (7.5 million subs)	6300	1.23
Shanghai	China Unicom	15.6 MHz (6 + 9.6 MHz)	90,000 (3 million subs)	6300	0.91
New Delhi	Airtel	10 MHz (8 + 2 MHz)	26,000 (1.2 million subs)	1483	**1.75**

Source: International Spectrum Seminar, December 2003, New Delhi

iii. **All other things being equal, all that the AIP version proposed in the Paper would achieve would be an increase in operating costs for mobile operators leading to a corresponding increase in tariffs for customers**. It should be noted that India's tariffs are presently amongst the lowest in the world, and this would be less likely to continue if operators' spectrum costs rise.

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

a. We would emphasise that **we are not in favour of the version of AIP** proposed in the Consultation Paper for the reasons given in our response to question (x).

(xii) Please provide your comments on the assumptions used in A.I.P.

a. We would **reiterate our concern that the version of AIP proposed in the Paper will not deliver any actual benefits for the Indian market and will instead load additional cost onto the industry and its customers**.

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

a. **We believe that in the case of existing operators,** the **current rationing approach** taken by the Government in assigning additional spectrum to operators once they have demonstrated efficient exploitation of current assignments – is a **more efficient method of managing the assignment of additional spectrum, and an auction approach is wholly unnecessary.**

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

a. Fundamentally, we believe that the **spectrum usage charges should be kept as low as possible to ensure affordable services and increased tele-density**. Our suggestions on spectrum pricing have already been made in the preceding text.

b. The **principle of no-worse off should be applied by the Authority.**

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

a. If there are **rural areas where coverage, even with 450 MHz, is uneconomic, additional incentives could be considered**, such as **reimbursement from the USO Fund.** However, the level of reimbursement should be assessed or verified independently.

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

a. Mobile operators have moved over to a revenue share basis since August 1999 for spectrum usage charges. **With the introduction of unified access licensing** (fixed and mobile services) and the **imminent introduction a full unified telecom license (**all telecom services), **the basis for charging for spectrum usage must also be aligned to a common basis for all wireless usage (fixed or mobile).**

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

a. **In the case of shared spectrum** we believe that the **spectrum charges should only be sufficient to cover the costs of administration and regulation of this resource**.

CHAPTER 5: SPECTRUM ALLOCATION

General Comments

1. The Authority must recognize that there **is already a well-set formula/ spectrum policy in place for allocation of spectrum to mobile operators, both GSM as well as CDMA.**

2. In the case of GSM **this formula / spectrum use policy was finalised by the Government after receiving inputs from an Expert Committee set up by the DoT** on January 28, 2003. The terms of reference of the Committee were as below :

   a. To examine the **current utilisation of assigned bandwidth** by various cellular operators;

   b. To **examine network design practices** followed by various cellular operators **from the point of view of optimal utilization of assigned bandwidth;**

   c. To **carry out comparison with internationally used norms and practices** in this regard.

3. The Committee comprised of Adviser (Technology), Telecom Commission, Wireless Adviser, Senior DDG (VAS), DDG(V), TEC and representatives from COAI and ABTO.

4. The **Expert Committee considered all the above aspects** and it was only **after elaborate network testing, deliberations / discussions at various levels with all stakeholders (including the CDMA operators), comparison with international practices, etc., recommended a roadmap for allocation of 2x15 MHz spectrum per GSM operator**. The allocation of additional spectrum was linked to pre-determined milestones of number of subscribers to demonstrate that the operators had adequately utilised the spectrum so far released to them. The formula laid down was as below:

Subscriber Base	**Spectrum**
Initial allocation	4.4 MHz/ 6.2 MHZ
Upon reaching 5 lakh subscribers	8 MHz
Upon reaching 8 lakh subscribers	10 MHz
Upon reaching 12 lakh subscribers	Upto 15 MHZ

A copy of the Report of the Committee is enclosed as **Annexure- [6].**

5. It is submitted that the **above spectrum use policy finalized by the Government, may now deemed to be part and parcel of the GSM operators' license as it has been implemented vide a** Ministerial Order issued by the Ministry of Communications (WPC Wing) vide Letter No. L-14047/06/2004-NTG dated April 15, 2004 for graded spectrum charges for allocations upto 2x15 MHz. A copy of the Order is enclosed as **Annexure- [7].**

6. It is further submitted that **this policy has since been implemented** and the GSM operators upon reaching the prescribed subscriber milestone, have already been allocated 10 MHz spectrum in the metros of Delhi & Mumbai (likely to go up to 12 MHz shortly) and are paying spectrum charges on a higher revenue share basis.

7. A **similar exercise has also been undertaken for the CDMA operators**. The Expert Committee comprised of Member (Technology), Wireless Adviser, Senior DDG (VAS), Senior DDG(TEC), JWA(N), DDG(BS), DDG(M) and representatives from COAI and ABTO.

8. We **understand from newspaper reports that the exercise has already been completed** and that the Committee has recommended the following spectrum allocation formula for the CDMA operators:

Number of Subscribers (in lakhs)

Spectrum Service Area	**2.5 MHz**	**3.75MHz**	**5 MHz**
Metro	Initial Allocation	4	8
A	Initial Allocation	7	14
B	Initial Allocation	5	5
C	Initial Allocation	4	8

A copy of the media report is enclosed as **Annexure- [8].**

9. It is submitted that the **Authority recommendations should be in consonance with the Spectrum Use Policy of the Government for both GSM and CDMA operators**, as arrived at by an Expert Technical Committee which considered all techo-economic parameters, international practices, optimal utilization of spectrum, future growth forecasts, etc and after participation of all stakeholders, arrived at the above formulae for additional allocation of spectrum.

10. In the light of the above, we believe that **both the Spectrum Allocation Approaches (Approach I and Approach II) tabled by in the Consultation Paper are inappropriate as they do not take into account the above Spectrum Use Policy of the Government or the fact that mobile operators have already acted upon this Policy**.

(xviii) How much minimum spectrum (refer approach (I) and (II)) in section 5.4) should each existing operator be provided? Give the basis for your comments.

a. It is submitted that a **Spectrum Use Policy, as finalized most recently by the Government, is already in place for GSM operators for levels up to 2X15 MHz**.

b. A **similar exercise has also been carried out for CDMA** and we believe that a **decision has already been taken in the matter. This decision should be implemented.**

(xix) At what stage the amount of spectrum allocation to new entrants be considered in the 800 MHz / 900 MHz / 1800 MHz frequency bands?

a. We agree with the Authority that **scarcity of spectrum should not impede the growth of existing operators and that adequate spectrum must be reserved for existing operators before considering the allocation of spectrum to new entrants.**

b. However, we believe that **with between six and eight competitors in most circles**, the Indian mobile market is already over-competitive and the **chances of fresh entrants in the short to medium term appear to be fairly remote**. Consolidation

has already been underway for the last 6 months, and further consolidation is expected by investment analysts[3]. Most mobile markets in the world have between three or four competing operators. Thus, we certainly do not expect entrants to come into the Indian market (if at all) until there has been substantial rationalisation among existing operators. **We therefore believe there is no benefit in reserving spectrum for new entrants, and the corresponding increase in costs for existing operators is a disadvantage for the industry and its customers**.

c. In fact the **Authority should consider the lessons from the assignment of 3G spectrum in Europe**. **Spectrum was reserved for new entrants in most countries, but a very large proportion of new entrant licensees have since frozen their operations, exited the market and/or returned their licences**.

(xx) Should spectrum be allocated in a service and technology neutral manner?

a. **Spectrum should be allocated for a particular service** (e.g. land mobile) but **licensees should be free to choose which technology they deploy**, so long as it **co-exists in a harmonised and interference free manner** with other adjacent users **within the National Frequency Allocation Plan/ ITU band** plans.

b. In particular, the **allocation of the entire IMT-2000 band intact,** maximises the amount of spectrum that can be made **genuinely technology neutral since *it provides an upgrade path for both GSM and CDMA technologies and allows the two to co-exist efficiently***. Allocation of spectrum for CDMA at 1900MHz would be a step backwards, because it would never be of practical use to GSM operators and would be, de facto, tied to a single technology.

(xxi) What should be the amount of cap on the spectrum assigned to each operator?

a. We believe that **as long as the spectrum is used efficiently and additional assignments can be justified** and **principles of level playing field and fair competition are ensured**, there should be **no artificial limit placed on the amount of spectrum per operator.**

(xxii) What procedure for spectrum allocation should be adopted for areas where there is no scarcity and in areas where there is scarcity?

a. Given the intense competition in the Indian mobile market, **it is highly unlikely that there will be any further entrants into this sector.**

b. The question therefore is of **spectrum allocation to existing operators** – here the factors that must be kept in mind are **alignment with international practices, efficient use, fair justification, level playing field**, **fair competition, etc.**

c. A total of 2x75 MHz has been earmarked in the 1800 MHz band. The **Government's efforts must be aimed at ensuring that this band is expeditiously freed for allocating additional spectrum to both GSM as well as CDMA operators**. We believe that if this spectrum is made available, there will be adequate spectrum for the 2G services of all mobile operators.

[3] "Indian wireless – In its infancy" UBS Investment Research, 24 March 2004

d. **Under no circumstances should the IMT-2000 band be corrupted**, it should be kept intact to be allocated to all operators once a 3G policy is announced.

(xxiii) Which competitive spectrum allocation procedure (Auction / Beauty Contest) be adopted in cases where there are scarcity?

a. In **the case of existing operators applying for additional spectrum, it is suggested that t**he current rationing approach taken by the Government in assigning additional spectrum to operators once they have demonstrated efficient exploitation of current assignments be adopted.

b. The **Government's efforts must be aimed at ensuring that the 1800 MHz band is expeditiously vacated for allocating additional spectrum to both GSM as well as CDMA operators** rather than adopting any allocation procedure which will not only drive up spectrum costs, but could also deny a deserving operator of much needed spectrum

(xxiv) Should we consider giving some spectrum in 900 MHz band to fourth CMSPs?

a. **This is a bilateral issue between existing GSM operators and would have to be mutually discussed and agreed to by the concerned operators** in a given service area.

(xxv) Comments of stakeholders are invited on the minimum blocks such as 2 X 2.5 MHz / 2 X 5 MHz of additional spectrum to be allocated to existing service providers in situations where IMT 2000 band is opened as well as in situation where it is not opened. Additionally, comments are also invited on the minimum allocation to new entrants.

a. It is submitted that IMT-2000 spectrum should be made available simultaneously to all existing/interested mobile operators.

b. In order to gain any of the advantages of the IMT-2000 band, **the TRAI must follow international convention and allocate the band in minimum blocks of 2x5 MHz**. To even consider sub-dividing the standard 2x5 MHz block suggests a misunderstanding the underlying benefits of the global IMT-2000 initiative, and would result in India missing out on the true benefits afforded by this band through needless cannibalisation.

c. In case the IMT-2000 band is not opened up, the question of allocating IMT-2000 spectrum does not arise. As submitted earlier IMT-2000 should not be considered as a continuum of 2G and **under no circumstances should any part of the IMT-2000 spectrum be allocated preferentially or selectively to any group of operators.**

(xxvi) In the event that IMT 2000 spectrum is treated as continuum to 2G, should existing operators using spectrum below the specified benchmark be treated as those eligible for IMT 2000 spectrum?

a. We **strongly oppose the IMT-2000 band being treated as a continuum of 2G.** To the best of our knowledge, **we do not believe that there is a single country in the world where 3G has been treated as a continuum of 2G.**

b. We would also like to reiterate that there are **severe and serious disadvantages to Indian mobile customers of throwing away the various and significant benefits of harmonisation** of this band with the global IMT-2000 community. **The IMT-2000 and 2G bands are two separate allocations and two separate services and must be treated accordingly**.

c. The Authority has mentioned that the imminent unified telecom license will allow operators to offer both 2G as well as 3G services. However, **IMT-2000 spectrum is undoubtedly reserved for 3G services and applications and should only be used for the same.**

d. The licenses of operators and the National Frequency Allocation Plan clearly prescribe the 2G spectrum bands as 800/900/1800 – existing operators must be allocated spectrum from these bands only, for their 2G services.

e. **Under no circumstances should the CDMA operators selectively and preferentially be given spectrum from the IMT-2000 band for their 2G services** – this would be clearly contrary to the TRAI's fundamental objectives to promote fairness and equality among all operators, international practices, etc.

CHAPTER 6: RE-FARMING, SPECTRUM TRADING, M&A AND SURRENDER

General Comments

1. Given the need for additional spectrum for mobile operators in India, we would **encourage the early release of spectrum from existing users and re-farming for mobile cellular services as soon as practica**l. **Spectrum that is unused or surplus post-UASL should be returned for reassignment.**

Re-farming of spectrum

(xxvii) What approach should be adopted to expedite the re-farming of 1800 MHz and IMT-2000 spectrum from existing users?

a. The Government **should seek to ensure that as much spectrum in the two bands is cleared of other users as soon as** practical.

b. **Licences for any services that are not public mobile should not be renewed**, and the Authority should consider encouraging such users to migrate to other bands.

c. The costs of relocating existing users to more appropriate bands should be investigated, as well as the benefits that might be derived from operating in more appropriate bands. The new cost (if any) should then be calculated.

d. Where existing users have a specific licence to continue to operate in the mobile bands, they should be incentivised to relocate, by being compensated for the net cost of relocating.

e. We understand these bands are primarily being used by the Defence. It may be pertinent to point out that that a **Group of Ministers set up late last year has already taken an in-principle decision to free up 25 MHz of additional** spectrum for mobile operators over the next 3 years. (See Media Report enclosed as **Annexure- [10].** It had also been reported that for freeing up these bands, a **sum of nearly Rs. 900 crores was expected to be made available by the Finance Ministry**.

(xxviii) What approach should be adopted for re-farming of spectrum after expiry of license?

a. **Existing users that are not public mobile operators should be required to vacate the band permanently on expiry of their licences.** They should not be compensated for the cost of relocating, because they are not forfeiting any right to the spectrum. Practically, they should be given reasonable notice and efforts should be made to secure new, more suitable spectrum for them.

Surrender of spectrum

(xxix) Should there be any refund for spectrum surrender in principle?

a. **Uses should only be refunded where they have been asked to surrender spectrum, in advance of the expiry of their licences,** so that the spectrum can be used by a public mobile operator.

b. The Government **should not be required not to give any refunds in cases where licensees have chosen to exit their businesses**.

c. However, **in cases where such surrender has become fait accompli as a result of a change in government policy – such as the introduction of unified access licensing, refunds for such surrender must be consider**ed.

(xxx) Should there be refund for spectrum surrender consequent to Unified Access license policy? If yes, what should be the basis?

a. Yes, as mentioned above, **in case of introduction of a unified access license, operators holding both fixed and mobile licenses** (and consequently both GSM as well as CDMA spectrum) **find that one of their licenses has become redundant. In such cases, where redundancy has been forced upon the operators because of government policy, refunds should be made.**

b. The **amount of refund could be based upon return of entry fee pro rata for un-expired term of license / spectrum taken from the time that the license became redundant – i.e. introduction of the unified access licensing policy.**

(xxxi) How should the amount of refund be estimated?

a. In the case of **redundancy created by Government Policy / Regulation, refunds should be provided pro-rata on the un-expired term of license calculated from the time that the license was rendered redundant by Government policy.**

b. In **the case of voluntary surrender, no refunds should be considered**.

Spectrum trading

(xxxii) Should we open up the spectrum market for spectrum trading? If yes, what should be the time frame for doing so?

a. We believe that it is **premature to consider introducing spectrum trading in India.**

b. In theory, spectrum trading offers the potential of increasing the efficient use of spectrum by allowing sale of spectrum by those with less need to those with greater need. However, **trading between bands allocated for different uses is fraught with difficulties**, including ensuring co-existence between users and securing economies of scale on equipment, etc.

(xxxiii) What are the pre-requisites to adopting spectrum trading?

a. The Authority should **draw up a timetable for the introduction of trading in each application area. Suitable property rights for spectrum**, clear trading procedures and so on will be required. **Licences may need to be modified** to allow associated spectrum to be traded. **Conditions for how charges for new primary assignments of spectrum and for ongoing ownership charges should be defined.**

b. Sufficient definition needs to be applied to property rights to ensure that the level of interference in adjacent spectrum is kept within acceptable levels.

Mergers & Acquisitions

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

a. It is submitted that **there is no need for a spectrum cap** as spectrum **allocated to the GSM operators has been paid for** through entry fee and incremental revenue share charges. Further, this **spectrum is assigned only after the operators provide full justification for each additional assignment**.

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

a. We firmly believe and strongly reiterate that **under no circumstances should IMT-2000 be considered as a continuum of 2G services.** These two are separate services with separate spectrum bands and should be considered and dealt with separately.

b. Further, it must be emphasised that **at no stage should IMT-2000 spectrum be allocated for 2G services**. **This will fragment and corrupt the IMT-2000 band, affecting blocking the migration of GSM and CDMA operators alike to this international 3G band**. This has serious implications, amply supported by data from other respondents to this consultation and also accepted by the WPC.

c. The **issue of interference must be exhaustively examined** as it would have a significant and adverse impact on WCDMA (GSM 3G) operators in the IMT-2000 band. The Consultation Paper recognises that there is a prima facie case of interference. This **incidence of interference demands a more detailed examination with extensive consultations with all stakeholders before taking any decision. The interests of the GSM industry would be severely compromised / endangered if this serious problem is disregarded.**

d. As regards the issue of caps, we believe that **as long as the spectrum is used efficiently and additional assignments can be justified** on the basis of the prevailing rationing formula, and principles of level playing field and fair competition are ensured, **there should be no artificial limit placed on the amount of spectrum per operator.**

(xxxvi) In case of M&As where the merged entity gets spectrum exceeding the spectrum cap, what should be the time frame in which the service provider be required to surrender the additional spectrum?

a. **There should be no requirement for a spectrum cap** as spectrum **allocated to the GSM operators has been paid for** through entry fee and incremental revenue share charges. Further, this **spectrum is assigned only after the operators provide full justification for each additional assignment**.