GSMA's response to the TRAI's consultation paper on spectrum related issues

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The GSM Association (GSMA) is the global trade association whose mission is to promote, protect and enhance the interests of more than 640 GSM mobile operators from more than 200 countries and territories. The Association's members provide mobile services to more than 1 billion customers throughout the world today.

The GSMA takes the opportunity to respond to TRAI's consultation paper on spectrum related issues for the mobile cellular market and would like to comment on several of the points made in relevant chapters. The GSMA believes that some of the assumptions made within the consultation paper are inaccurate and a regulatory conclusion based on the same could lead to far reaching adverse consequences for one of the most promising mobile markets in the world. A wrong decision in this key spectrum resource issue could also lead to confusion and endanger planning, security and trust in capital investment as well as product development in Asia and worldwide. The importance of long term planning is critical for the mobile industry where large capital investments are required. More specifically, the GSMA would like to emphasize certain principles that it believes TRAI should take into account when considering future spectrum allocations and pricing:

- The value of assigning mobile spectrum that is harmonized worldwide is essential to achieving economies of scale, affordable low cost and seamless global roaming.

- 3G is important. New spectrum needs to be allocated quickly for 3G in order to enable the Indian industry to keep pace with the development of other Asian countries because 3G is key for many industrial sectors, for economic development and for generating opportunities for Indian citizens.

- Regulators around the world are currently re-thinking the forms to make spectrum available for commercial use, as high-priced auctions have delayed offer of new services to consumers.

1 Introductory remarks

Spectrum is a key resource for mobile communications. The GSMA appreciates the commitment by TRAI to consulting the industry prior to making decisions on this critical issue. Continuity and stability in this field are important for the mobile industry. These can only be achieved if consistency and strategic aspects are taken into consideration on decisions about spectrum. Spectral efficiency improvements need planning and security measures to occur. Therefore, we urge the Authority to give careful and critical consideration to the risks associated with some of the options discussed in the consultation paper. Our view is that **a number of options discussed in the consultation will put GSM operators at a significant unfair disadvantage to CDMA operators**. We are confident that the Regulator has an open mind and has not entered this debate with a pre-arranged decision.

The most important target in the GSMA is providing maximum efficiency in delivering mobile services from a user perspective, from a cost perspective and from a resource use perspective. This is why GSM is much more widely accepted in the operator and user community worldwide than any other standard offerings.. GSM ensures sustainable economies-of-scale benefits for developed and emerging market countries worldwide.

The GSM evolution from 2G to 3G is characterized by the term 3GSM: it provides a variety of spectrally efficient solutions for voice and data. Interoperability is a main characteristic in this evolution – one common core network is able to integrate several radio layers from 2G to 3G. Spectral efficiency improvements are crucial for data and multimedia services. Therefore, the 3GSM (WCDMA) radio layers can be deployed offering spectral efficiency improvements up to 8-10 times higher than today. Taking these developments into account, the GSMA recommends that TRAI takes the medium- to long-term perspective into consideration in order to achieve decisions from a strategic vantage. Medium- to long-term means that the allocation of the IMT 2000 Core Bands (WRC-92 Bands) according to the worldwide preferred harmonized band arrangement for FDD from 1920 to 1980 MHz uplink and from 2110 to 2170 MHz downlink should occur in India in a timely manner. For further planning on the preservation of the IMT 2000 Extension Band from 2500 MHz to 2690 MHz, band arrangement will be decided at the WRC-07, as well as the later phase to the 1710 to 1880 MHz as Extension Bands for IMT 2000 via service and technology neutral license conditions within compatible interoperable standards.

We would value a positive decision for IMT 2000 as a result of this Consultation. IMT 2000 is – from a domestic and an international perspective – seen as the most important cornerstone of the development of the Indian mobile sector into the third and fourth generations that will drive the future of the global mobile industry, and ultimately enable India to join the leadership of the mobile communication industry in the next phases of development. The GSMA herewith offers its comments and responses to TRAI's Consultation.

Prior to answering the questions raised in the Consultation, we would like to offer our comments on the individual chapters in the Consultation.

Chapter 1:

The Indian wireless market reached 36 million users at end of May 2004. During this month, 1,29 million users were added. The GSM growth was close to 1 million, compared to 0,3 million CDMA users. We observed similar growth relations worldwide between GSM and CDMA, and the figures demonstrate the leading position of GSM with 73% worldwide mobile market share today. Our view is that the Indian market will continue to grow at an even higher rate and could contain between 50 to 60 million users by 2005.

In light of such aggressive market growth, it is no surprise that Indian operators claim to need additional spectrum. This was reviewed by the Government resulting in preservation of up to 2 x 15 MHz spectrum per GSM operator. We understand that an Expert Committee was set up for this purpose, which included a Wireless Advisor, Secretary, DoT, Member, Technology, and representatives from both the GSM and CDMA industry. We believe that it was only after elaborating techno-economic considerations, intense network testing and discussions with all stakeholders from the GSM and CDMA sides that the spectrum policy was announced. We understand that an identical exercise is being undertaken to also evaluate the spectrum requirements of the CDMA operators. TRAI could await the completion of this process by the Policy Maker and ensure that the decisions of the Expert Committees in regard to both GSM as well as CDMA spectrum be honoured.

The TRAI Consultation relates to the spectrum calculation methodology from the ITU-R, which was used for spectrum estimation in the 3 ITU Regions in the world by considering their specific demographic situations. If we take – after 5 years of this estimation - a look into a developed region like Europe, we recognize countries with higher penetration rates (= 80%) than assumed, with reasonable spectrum assigned. Most of the countries have 2G spectrum of between 2 x 40 MHz to 2 x 90 MHz per country. If we look to India, we understand that the total spectrum earmarked is 2 x 120 MHz while the amount available is 2 x 68,4 MHz (as shown in Table No.2.3). The roadmap for 2 x 15 MHz per operator has already been set by the Government, which we believe will be sufficient in the short term. The problem seems not to be the total amount of spectrum in the country - given between 5 to 8 mobile operators – but how to ensure that successful operators have enough spectrum, and ultimately that actual traffic is taken into account. We therefore suggest that spectrum decisions based on the generic ITU-R methodology or on theoretical system comparisons would not be very helpful. We can assume that incumbent operators use spectrum more efficiently, because of their market know-how and their larger market share that presses them to intensify radio sites. Further, smaller operators could consolidate and merge – this would be facilitated by the M&A policy already in place and would contribute to better spectral efficiency.

- **Our Recommendation is to proceed forward from the Spectrum Policy already in place (2 x 15 MHz per GSM operator).**
- **We suggest that the 1800 MHz bands be used for 2G deployments, according to the National Frequency Allocation Plan (NFAP), as they are contractually part of the existing licenses.**
- **In order to prepare India for the emerging mobile data market, the Government should announce its 3G Policy soon.**

Chapter 2:

The ITU frequency arrangements shown in section 2.3, Table 2 were designed after WRC-00 by ITU-R WP 8F. Some of these arrangements are outdated. Only the arrangement B1 is currently licensed to approximately 130 operators in 40 countries worldwide, and 30 to 40 networks with more than 5 million users are in public service already. Most countries have been careful to avoid a combination of the North American PCS plan with the IMT 2000 Core Band, as suggested in Section 2.6.2 in the TRAI Consultation. This is because the PCS plan interferes with IMT 2000. Consequently, Indian GSM operators' evolution to 3G/WCDMA would be undermined; even if a small part of spectrum would be allocated in the IMT 2000 Core Band for PCS, there will be very high levels of interference both at the BTS level and also in the handset terminals. Terminal interference will be challenging to mitigate. Addressing BTS interference would reduce spectrum utilization considerably in addition to its great expense. Consequently, enormous delays for product developments and network deployments for alternative 3G roadmaps would result.

We understand that 2 x 68,4 MHz can be made available in the short term. A stable regulatory policy should respect the existing commitments made by the Government and spectrum should be allocated according to the promises made to the operators.

- **Our Recommendation is that all operators should get the spectrum that has already been committed to them by the Government, if they can justify that their existing allocated spectrum is efficiently utilized.**
- **In addition, we recommend that TRAI announces a spectrum policy for IMT 2000 Frequency Arrangement B1 for exclusive IMT 2000 use.**

The IMT 2000 bands must not be misused as 2G extension bands. This is important for stability and continued capital investment in the mobile sector. A clear 3G policy would certainly create a significant progress in overall investment in infrastructure and further increase tele-density via mobile services.

Chapter 3:

The applied ITU methodology in this Chapter was developed for WRC 2000 to estimate IMT 2000 spectrum in general terms. The methodology is not appropriate for individual operator spectrum estimations.

Comparisons of radio technologies are generally challenging. This has been shown many times in the past, as there are too many radio parameters that come to bear. Comparing operators' spectral efficiencies are even more complex, because their radio planning parameters are different and so are competing operators' business models. It is our view that the methodology, the assumptions, and comparisons made in this Chapter are discriminatory for GSM. For these reasons, the GSMA disagrees with the conclusions on spectral efficiency in this section:

- To provide an example is the re-use 9 for TCH TRX (not for BCCH TRX), as many GSM networks are using frequency hopping and fractional loading allowing a re-

use factor ranging between 1 and 3. Indian GSM operators are already using a variety of advanced techniques for optimal spectrum utilization.

?? Another point relates to data services, which have to be included in the five year forecast for India because their spectrum demand will be in the same order of voice of higher. Data usage in India and worldwide is growing rapidly. There are about 300 GSM networks using GPRS data, offering Internet and MMS services, including global roaming, that allows users to receive and send email messages wherever GPRS coverage exists in the world. Methodologies, which were developed based on Erlangs, cannot successfully be applied to such spectrum demand calculations. The analysis in Section 3.2.2 for voice based on Erlangs is not appropriate for data. ITU-R WP 8 F is presently working on a new methodology.

It is the GSMA recommendation not to use the results of the Calculations and the Conclusions in Chapter 3, since the methodology is not adequate to allow a comparison between GSM and CDMA networks.

Chapter 4:

This Chapter discusses the cost of deployment with respect to infrastructure costs in the AIP approach. It does not consider the cost of entry. Indian GSM operators have paid entry fees. We believe there is case to adding to spectrum costs. It must be kept in mind that in an emerging economy like India, where accelerated tele-density is a national priority, spectrum pricing should be kept low and upfront payments should be limited or avoided.

Our Recommendation is that GSM operators which have paid high entry fees should pay nominal usage charges (to cover cost of administration and regulation) for additional spectrum after 2 x 15 MHz.

Chapter 5:

A spectrum allocation scheme is already in place for GSM operators for up to 2 x 15 MHz, with long-term availability for up to 2 x 20 MHz for six mobile operators. According to GSMA estimates, 2G will not require more bandwidth if 3G/IMT 2000 is introduced in a timely fashion. Therefore, we see no reason for Approach I or II for spectrum allocation.

There should be no predetermined limit placed on the amount of spectrum per operator. We strongly oppose IMT 2000 being treated as a continuation of 2G. 3G/IMT 2000 licenses should be treated separatedly.

We see no relevant application for Approach I or Approach II.

We recommend that TRAI stays in line with the existing National Frequency Allocation Plan for different services/uses. The NFAP is in line with ITU.

Chapter 6:

In light of the rapid mobile market growth, refarming spectrum for mobile communication is important for the development of India's telecommunications infrastructure. Thefore, licenses for any services that are not public mobile, should not be renewed, and users should be encouraged to move to other bands. Spectrum trading is still being debated in other regions of the world, but we believe that it would be premature to introduce this in India. Instead, we recommend observing and evaluating the ongoing debate and international developments in this area.

We appreciate the intentions of TRAI to discuss ways of how to refarm spectrum for future mobile use.

It is currently too early to introduce spectrum trading in India.

2 Responses to consultation questions

Chapter 2: Current spectrum availability and requirement

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

There are regulatory trends worldwide to make spectrum technology neutral. New licenses not be granted for one technology only.

Interoperability is, especially in the light of emerging mobile data services, a key requirement in this context. Recently, CEPT/ECC in Europe decided on a technology-neutral use of frequency bands in the 400 MHz range. In deciding whether or not to assign the 450 MHz spectrum to mobile use, TRAI should investigate other areas of potential demands for this spectrum (e.g. PMR/PAMR and point to point microwave links) and balance the interests of all potential users.

The use of CDMA in other bands has to be in line with the existing license conditions: namely the 1700/1800 MHz band. However, where the question relates to CDMA 2000 1x EV-DV, it is a worldwide understanding that CDMA 2000 1x EV-DV is an IMT 2000 standard for which IMT 2000 bands should be used. These can be allocated only after a 3G policy is announced and 3G spectrum is made available, equally to both GSM and CDMA operators. This is an important action as we believe India is ready for 3G and the use of IMT 2000 bands, fair competition would be allowed between all 3G players and technologies.

In the case of a decision to utilize the 450 MHz band for public cellular networks, we strongly recommend to introduce license conditions, which are harmonized with the existing regulations, especially regarding technology neutrality.

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

The ITU method used in the consultation document is, as stated, useful for general spectrum demand calculations e.g. for a region or a country as used for the WRC-2000. However, such methodology cannot be used to compare technologies or differently designed operator networks. In addition, with the expected growth of data services and the move from circuit-switched to packet-switched transport, the ITU-R spectrum calculation methodology needs to be improved. It is questionable whether the Erlang based considerations are useful in such a new methodology. The ITU-R methodology is presently under discussion. It is again planned to produce averaged spectrum estimations in the regions. Operator related spectrum demand cannot be based on the same methodology, because its business model puts voice into 2G or 3G layers. In the case of 3GSM, in both, because of automatic handoff, radio network design, economical considerations, the radio resource management and its specific service profile including QoS parameters that play distinctive roles.

Another area that considerably influences the spectrum demand is that of service subscriptions and their traffic models. These depend very much on forecasts. For voice, we estimate that in 5 years India will experience traffic levels similar to what are currently experienced in developed markets. In developed countries, mobile penetration rates are today between 60 to 90%, and frequency assignments per operator are on average 2 x 17 MHz per operator. In Western Europe, for example, the numbers of subscriptions far exceeds the forecasts from the late 1990s, when the spectrum requirements were calculated.

Given the relatively low tariffs in India, and considering the corresponding high levels of mobile usage and technology innovation described in Annexure E of the TRAI Consultation, we estimate the spectrum with which each GSM operator will be able to operate its network as the 2 x 15 MHz that has been now earmarked by the Government. If we consider that, in a five-year timeframe, 3GSM (WCDMA) radio expansions of GSM networks in India will provide far more traffic capacity than 2G networks have today and portions of data and voice traffic will be taken over by WCDMA, we believe that sufficient capacity exists even beyond 2008.

Although there is a clear trend toward increased mobile data use, it is not yet possible to provide an accurate forecast of 3G data traffic in India. However, the spectral efficiency figures for voice and data services (Annexure B/Appendix 1, Table 15) appear too low, from current experience, especially if more voice traffic develops in 3G networks, which provide far higher spectral efficiency. In addition, the calculation is valid for loaded networks. We would like to suggest that in the initial phase of 3G networks, such calculations cannot be used, because the operators have to provide coverage, not network capacity. The amount of spectrum for 3G is therefore dictated by the

need to launch new data services (for which adequate spectrum is required to provide good grade of service).

The investigations made by the GSM industry, CDMA and other related industries in the UMTS Forum, based on international traffic models have shown that the minimum bandwidth per 3G/IMT 2000 operator is 2 x 10 MHz, and the optimal start-up bandwidth is 2 x 15 MHz + 5 MHz (unpaired). This means that hierarchical networks can be deployed by six mobile operators in the IMT 2000 harmonized "Core band" (from 1920 - 1980 MHz/2110 - 2170 MHz duplex). Therefore, we recommend an allocation of 2 x 15 MHz per operator or at least 2 x 10 MHz of IMT 2000 spectrum for the evolution from GSM to IMT 2000.

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

The primary bands for IMT 2000 use are the bands in the 1900/2100 MHz range, often-called "Core Bands," for which today's 3G technologies have been developed. The band plans, as well as network deployments in Korea and Japan, show that this is not only the case for 3GSM (WCDMA) but also for CDMA 2000 products. Additional IMT 2000 bands, identified by WRC-2000, are the bands 806 - 960 MHz (differing among countries and regions), the bands 1710 - 1885 MHz, and the bands 2500 - 2690 MHz. The primary focus of regulators is presently the 2500-2600MHz as the main expansion band for 3G. The preparatory work for WRC-07 already gives a signal to the mobile industry to start developing such frequency bands.

The question is whether or not it would be appropriate for India to decide in the short-term to expand the IMT 2000 Core Band to 1710 – 1880 MHz. As this band is already licensed in many countries in the world, and also India, for 2G use, the time table for its availability for 3G would be put at risk.

Whilst the allocation of 1710 - 1785 MHz paired with 1805 - 1880 MHz to IMT 2000 is desirable for improved long-term efficiency, it is not a solution to the short-term need to introduce 3G services in India. It will take some time before other operators worldwide introduce 3GSM (WCDMA) into this spectrum; and, therefore, 3G handset scale economies will not be available at the time of network launch. We therefore recommend that the IMT 2000 band should only be expanded for the long-term to cover the whole of 1710 – 1785 MHz paired with 1805 – 1880 MHz, provided that IMT 2000 spectrum in the primary bands is made available to all operators.

(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?*

IMT 2000 spectrum should be considered independently from 2G licenses. Both 2G and non-2G operators should be allowed to bid for IMT 2000 spectrum. The IMT 2000 spectrum should enable operators to introduce a high-speed overlay network to their existing mobile networks, and thus site sharing should be promoted (according to 3GPP standards). The evolution to 3GSM brings the ability for the user to access both 2G and 3G networks, enabling superior quality of service for all applications. Customers will have access to dual-mode handsets and will be unaware of which bands are being used to deliver which services.

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

The reorganization of spot frequencies to create more contiguous bands makes the frequency blocks wider and, therefore, brings greater spectral efficiency and more flexibility for operators. The work should be done in co-operation with the Indian operators. We understand that this process is already underway.

(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.*

The 1880 – 1900 MHz band should be technology-neutral and reserved for TDD operations only. This is an important band for the operation of Cor-DECT. Cor-DECT provides a valuable service to the rural communities of India, where it has distinct advantages. Each system is self-organizing, requiring no individual spectrum assignment, and allowing public and private residential systems to co-exist favourably. It is focussed on the delivery of inexpensive fixed telephone services. Equipment is readily available, having been proved effective 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. If the 1880 - 1900 MHz band were allocated for mobile use, then the TRAI might be obliged to clear these unlicensed users from the band to prevent interference, with the consequent loss of rural services.

In addition, there are now estimated to be more than 250 million residential cordless telephones worldwide, that use the DECT standard. These terminals may be easily imported or produced locally for use in India.

The 1880 – 1900 MHz band, paired with 1970 – 1990 MHz, and would be a specific Indian frequency arrangement, not in line with worldwide harmonized

use of IMT 2000 technologies. Therefore, it would require specific technology development. We recommend that this frequency arrangement not be considered, since the upper band is part of the IMT 2000 paired band, and would render its IMT 2000 pair useless. It may also create the need for increased introduction of additional guard bands, thereby further reducing the overall utility of the band. Given the amount of international effort that has gone into ensuring efficient compatibility between GSM 1800, DECT and IMT 2000 allocations, it would be counter-productive for India alone to introduce a sub-optimal deviation.

Chapter 3: Technical efficiency of spectrum utilization

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

We believe the methodology used is not developed enough to allow a comparison between GSM and CDMA networks. By taking into account the great variety of capacity solutions exist in all technologies, clear conclusions cannot be drawn from these considerations. The challenge of such comparisons lies in establishing equal conditions (technically, economically, area, environment) and equal traffic/QoS assumptions. Operators' business models are different, assumed that all networks are built efficiently providing optimal capacity and some capacity reserve, something that is not visible to the outside. We assume that all networks today can accommodate more users, even with the current bands. The main question is usually the network investment. Given the allocation of up to 2 x 15 MHz, we do not believe that the GSM operators will run into problems due to spectrum shortage in the short term.

Figure 3.14 in the Consultation shows that CDMA networks in India have large capacity reserves in high traffic areas, in the order of a factor of 2.5. A relatively low packing density of CDMA cell sites has kept the investment low. Clearly, a cell size reduction by a factor of 3 enlarges capacity by 9. However, there is a non-linear progressive capacity growth possibility that is probably not yet utilized in all networks in India. We suggest that **TRAI should promote equality in levels of infrastructure investment, in terms of *equivalent base station density*. This will result in greater equality between operators** in terms of capital expenditure, and reduce the risk of disadvantaged (yet, otherwise efficient) operators from being forced to exit the market. This, we believe, serves the best interests of consumers.

Chapter 3.2.2.9 "Capacity enhancement techniques for CDMA 2000 1x" considers the demand for multimedia services, increased data rates (and therefore system capacity) as separate carriers shall be assigned for building up a CDMA 2000 1x EV-DO data network. We suggest that this capacity enhancement relates to data services only, and that voice services are not included. Further, we draw the attention of TRAI to the fact that 1x EV-DO is a mobile data system, and regarding data rates it belongs to the IMT 2000 services, therefore it has to be compared with other 3G systems. Spectrum consequentially should be in the IMT 2000 bands. If not, it would be unreasonable not to release IMT 2000 bands for the GSM operators,

preventing them from introducing WCDMA as the most spectral efficient technology for voice and data today (14,4 Mbps being possible with WCDMA).

(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 expect that within five years, multimedia services will generate an increase between four and ten times in required network capacity. Advanced 3G technologies such as 3GSM, with high spectral efficiency, will provide the capacity, and reduce the need for additional spectrum. The sum of these two effects leads to about the same required increases in spectrum needs per operator as they would have for voice. We expect that mobile operators wishing to offer multimedia services within the next years will need 3G network radio layers to carry this traffic. For GSM operators, this will require IMT 2000 spectrum for WCDMA radio overlays in their existing networks, as operators in Europe and Asia have done - higher bandwidth of 3G carriers allowing higher bandwidth services to be offered to individual users.

Chapter 4: Spectrum Pricing

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

The GSMA suggests that in a competitive market such as India, operators do not have the leverage to generate excessive profits, and, therefore, higher taxes would 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. We would therefore advise against any tax component in spectrum pricing.

Neither is there a need for spectrum pricing to act to discourage inefficient use of spectrum. The Government already has a well-established mechanism for this – by partially withholding spectrum assignments from operators until they have accumulated a sufficiently large base of customers (and, ideally, demonstrated adequate exploitation of existing spectrum assignments). Using pricing to further discourage inefficient use of spectrum is therefore unnecessary, and its only effect would be to increase costs to operators and prices to customers. We would suggest that further evolving the mechanism for measuring adequate exploitation of spectrum assignments, and using this as the primary means of triggering the award of further assignments, is the optimal and only necessary means of achieving the Regulator's underlying 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)

While the GSMA believes that the specific format of spectrum pricing in India is an issue that should be commented by the local operators in India, our experience has revealed that Regulators are becoming more aware of the downside of high pricing spectrum. Recent auctions In the United States and Western Europe have shown that auction designs that promote high pricing can cause delays in provision of services and effective use of the spectrum auctioned.

(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?

We are not recommending AIP. If this or another method should be introduced, then GSM must be the reference point because it is the predominant standard with 73% of the market worldwide and similar share in India.

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

No comment.

(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.

We do not recommend an auction process that leads to excessive payments for spectrum undermining network investment.

(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?

No comment.

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

If India's operators were allowed to exploit the 450 MHz band (subject to the conditions outlined in our response to question (i)), in preference to assignments in the 1900 band (that would jeopardize the efficient assignment of the full 1800 - 2100 MHz band), they should be allocated spectrum in a technology-neutral way. A number of countries around the world have begun to make the 450 MHz bands technology-neutral, in order to provide more flexibility for network deployments in the PMR, PAMR, point-to-point microwave links, and other cellular markets. Regarding the licensing of the 450 MHz for 1x EV-DO, which is a 3G technology, TRAI is asked to provide a fair treatment of GSM operators and open the IMT 2000 bands for 3GSM (WCDMA).

If there are rural areas where coverage, even at 450 MHz, is not economically feasible, additional incentives could be considered, such as a reduction on spectrum fees. However, the level of reduction should be assessed and 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?

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) and the imminent introduction of a full unified license (all telecom services), the basis for charging for spectrum usage must also be aligned with a common revenue-share 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?

Spectrum charges should only be sufficient to cover the costs of administration and regulation of the resource. In this process, if there is a variation between the costs for shared versus protected spectrum, then a difference pricing is justified.

Chapter 5: Spectrum allocation

(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.

[See question (ii)] We estimate that five years from now, we will be facing similar levels of voice traffic density as is currently experienced in developed markets elsewhere in the world. In those countries, GSM assignments per operator are, on average, of 2 x 17 MHz. We therefore believe that 2 x 15 MHz as presently indicated in the licenses in India should be sufficient for 2G

services in the short-term. However, as we envisage strong growth from data, we recommend that TRAI make a strategic decision to release the IMT 2000 Core Bands. The 3G technologies for these bands are available, the spectrum plan is already harmonized and implemented in more than 30 countries in the world, including those which are deploying both, WCDMA and CDMA 2000 radio networks.

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

It is one of the roles of the regulator to seek a balance between the number of operators that are allowed to enter the market and the amount of spectrum that each is assigned. International practices of number of operators in other markets should be taken into account. If there are too few operators, each may have adequate spectrum, but the market will be uncompetitive. If there are too many operators, each will have an inadequate amount of spectrum, and there may be excessive competition and subsequent consolidation or exit from the market. The management of spectrum is therefore an important lever in achieving this balance.

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

Spectrum should be allocated for a particular service (e.g. land mobile) but licensees should be free to choose which technology, within a framework standard (e.g. the ITU/IMT 2000 RTT's), they deploy, so long as it can co-exist with adjacent users.

From a standards perspective, the IMT 2000 bands are effectively technology-neutral, because they allow all 3G operators, using mixed technology platforms such as ITU-RTT technologies, to coexist. In particular, seen from a 2G point of view, the allocation of the entire IMT 2000 band maximizes the amount of technology that can be made genuinely technology-neutral, since it provides an upgrade path for both GSM and CDMA technologies.

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

Most regulators are moving away from spectrum caps.

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

Given the intense competition in the Indian mobile market, it is possible that there may not be, in the short-term, further entrants into this sector. 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, and fair competition, among others.

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

We discourage auctions that focus on increasing cost of spectrum, therefore reducing investment in network roll out.

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

Where available, yes, as it will help the fourth GSM player to minimize coverage costs in rural areas. There are many examples of GSM countries where all or most operators have assignments in both the 900 MHz and 1800 MHz bands. In cases where it has been allocated under license, we recommend that TRAI allows bilateral discussions and agreements between the 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.

We believe the IMT 2000 band should be opened as soon as possible, as several GSM operators in India have already requested access. It is our expectation that most operators will follow the same technology route adopted by the majority of mobile markets around the world, and implement 3GSM (W-CDMA). This operates on a 5 MHz carrier basis. Operators that have launched W-CDMA, or are about to launch W-CDMA, are using either 2 x 10 MHz (+ 5 MHz) or 2 x 15 MHz (+5 MHz). We believe that similar assignments are required for the Indian market. The present IMT 2000 Core Band would allow six operator licenses each with 2 x 10 MHz (+5 MHz). The European licensing in 3G has shown that ultimately no more than four-to-five operators will be in competition. Also, the example in Sweden shows, that – especially in the rural areas - infrastructure sharing includes spectrum sharing is considered.

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

IMT 2000 spectrum should be considered separately from 2G spectrum in such a way, that both – 2G operators as well as new entrants can apply for an IMT 2000 license. The majority of the IMT spectrum assigned worldwide has been assigned to existing 2G operators offering GSM services. For incumbent operators, the benefit is that they can continue the evolution of the networks. IMT 2000 spectrum provides the opportunity to enhance the capability of existing mobile operators, by giving them the route to offer higher speed services and to support increasing traffic capacities, including voice. Regarding licenses for new operators, these operators should be allowed to roam with 2G operators.

Chapter 6: Re-farming, Spectrum trading, M&A and Surrender

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?

The regulator and government should seek to ensure that as much spectrum in the two bands is cleared of other users as soon as practical.

Licences for non essential services, that are not public mobile, should not be renewed, and the TRAI should consider encouraging users of current licences to migrate to other bands.

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 net cost (if any) should then be calculated.

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

The cost of relocating should be met by all mobile operators in the band in question, in proportion to the size of their assignment.

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

Existing users that are not public mobile operators should be required to vacate the band permanently on expiry of their licences. 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?

Users 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.

The TRAI should be careful not to refund licensees where operators have voluntarily chosen to exit their businesses.

In case of costs to operators created by the government policy/regulation, refunds should be provided pro-rata to un-expired terms of licenses. In case of voluntary surrender, no refunds should be considered.

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

Yes, as mentioned above, in cases where the introduction of a unified access license (where operators hold both fixed and mobile licenses) fan operator finds that one of its licenses must be surrendered because it is redundant. In such cases, where redundancy has been forced upon the operators because of government policy, refunds should be made – pro rata to un-expired term of the surrendered license/spectrum.

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

Must be calculated on a case by case basis.

Spectrum trading

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

Spectrum trading offers potential to increase the efficient use of spectrum, by allowing the transfer of rights of use, from those with less need to those with greater need.

The GSMA believes that for India it is premature for India to introduce spectrum trading. Therefore, it is recommended that TRAI observe the

international regulatory discussion and practice in this area prior to any decisions. In the longer term, spectrum trading could enable increased flexibility in business planning by allowing spectrum users to trade underused spectrum or purchase spectrum to assist in implementing end to end solutions, in turn ensuring that spectrum is not underutilized.

However, to realize the benefits outlined above, and to ensure that spectrum users feel confident in trading their spectrum, detailed consideration must be given to the mitigation of harmful interference. Detailed technical studies must be submitted by the trading parties for approval by the regulator and must be open to scrutiny and challenge before any change of use or trade is allowed. The absence of such studies or opportunity to challenge will create an environment where there is uncertainty in business planning for spectrum users, which could lead to the unsuccessful implementation of spectrum trading. In some instances, where a change of use is being considered, it may be deemed appropriate for the regulator to hold a public consultation.

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

Secure spectrum property rights and clear definition of how much spectrum each operator is entitled to in the broad picture of spectrum regulation.

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?

In the event that two or more operators merge in a given circle, the new entity should be required to return to the regulator any surplus spectrum, beyond the amount corresponding to the total number of customers, including the prevailing caps.

(xxxv) In case, IMT 2000 is considered as a continuation 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?

As aforementioned, IMT 2000 should not be considered as a continuation of 2G.

(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 typical time period of 12 months should be allowed for this transfer to be completed.

ABOUT THE GSM ASSOCIATION

The GSM Association (GSMA) is the global trade association whose mission is to promote, protect and enhance the interests of 640 GSM mobile operators from more than 200 countries and territories. The Association's members provide mobile services to more than 1 billion customers throughout the world today. The GSMA aims to accelerate the implementation of collectively identified, commercially prioritized operator requirements and to take leadership in representing the global GSM mobile operator community with one voice on a wide variety of issues nationally, regionally and globally.

The GSM family of wireless communications platforms, including GSM, GPRS (General Packet Radio Services) and EDGE (Enhanced Data for GSM Evolution) and 3GSM (WCDMA) account for 73 percent of the total digital wireless market today. The GSM Association is a unique organization, with truly global reach, offering a full range of business, technical and public policy services to its members. For more information, visit the website at www.gsmworld.com.

The GSM Association's Board comprises the following operator companies and multinational groups: AT&T Wireless Group; China Mobile; China Unicom; Hutchison Group; KT ICOM; Maxis Mobile; mmO2 Group; NTT DoCoMo, Inc.; Orange Group; Orascom Telecom Group; SFR Cegetel; SingTel Group; SUNDAY Communications Ltd; Taiwan Cellular; Telefónica Móviles Group; Telenor Mobile Group; TeliaSonera Group; TIM (Telecom Italia Mobile) Group; T-Mobile Group; Turkcell and the Vodafone Group. The Board also includes the GSMA's CEO and Chairman of the Executive Management Committee.

The GSM Association believes the information submitted in this document to be correct at the time of submission.

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