

Consultation Paper on Spectrum Related Issues:
Efficient Utilisation, Spectrum Allocation,
and Spectrum Pricing

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**Siemens Response to the
TRAI Consultation on Spectrum Related Issues:
Efficient Utilisation, Spectrum Allocation, and Spectrum Pricing**

Dear Madams and Sirs,

Siemens recognises the comprehensive consultation of TRAI on spectrum related issues. We would like to use the opportunity to comment the process of spectrum allocation for further development of mobile telecommunication services in India.

India is a country with vast potential - rich natural resources and a great pool of scientific, professional and entrepreneurial talent. India has embarked on process of modernisation and there is no looking back. And we at Siemens stand behind this progress. We are proud of contributions we have made to India over the past 135 years – and we intend to do our share in ensuring that India emerges as a leading industrial, economic and financial power.

As a good corporate citizen everywhere we operate, we want to partner India into the future. We can say with confidence that we understand the country better than any other global player. With our strong and reliable local presence, we are the ideal partners for realizing India's needs in infrastructure development.

As a main supplier of 2G/2.5G and EDGE infrastructure products and mobile terminals for the cellular and cordless market and as the leading supplier of 3G/IMT-2000 equipment we would like to provide the Siemens Information and Communication Mobile's opinions in response to the TRAI questions on the policy priorities and objectives concerning the spectrum extension for operation of the mobile telecommunication systems in India.

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Let us express already in this cover letter, that we wish TRAI to make the best recommendation to the government for a strategic decision on mobile communications, so that India will join the leading States in this field in Asia Pacific.

Please find our comments and responses in the attachment.

We hope that you will find our contributions useful and wish you furthermore a successful consultation and insightful results.

Yours sincerely

Christoph Legutko
Spectrum Policy

Attachment**Siemens Response to the****TRAI Consultation on Spectrum Related Issues:
Efficient Utilisation, Spectrum Allocation, and Spectrum Pricing****Executive Summary**

The main recommendations in our response are summarised below for your convenience:

1. The 450 MHz band could be useful for rural applications and should be licensed on a technology neutral basis if not needed for PMR/PAMR services.
2. The IMT-2000 bands should be kept separated for licensed applications from 2G. WCDMA as well as CDMA 2000 1x EV-DO technologies should be allocated in the IMT-2000 bands according to ITU-R Recommendation M.1036-2 frequency arrangement B1.
3. The 1880-1900 MHz band should be technology neutral for TDD operation only.
4. Spectrum in the bands 1710-1785 MHz paired with 1805-1880 MHz should be used for 2G – according to the existing license conditions. It should not be decided for immediate 3G use, instead it should be considered as 3G extension band later in line with international consensus on 3G use of this bands.
5. We do not agree with the spectrum efficiency comparisons given in the chapter 3 because they are not usable for technology comparisons. We recommend not using its conclusions for spectrum decisions.
6. 3G policy should be decided soon in India by announcing of the IMT-2000 core bands (frequency arrangement B1 from M.1036-2) for giving the industry the planning security for introducing the enhanced mobile services towards multimedia.
7. We support the refarming under the clear defined conditions for the benefit of more mobile spectrum in the future.
8. Spectrum trading should only be introduced for achieving of more efficient and flexible use of spectrum but only in the framework of ITU-R harmonised spectrum arrangements. Spectrum speculation must be avoided.

General Remarks:

Siemens Mobile ICM appreciates this detailed Consultation and will respond to questions related to Chapters 2 to 6. Chapter 4 is dealing with pricing issues. As a supplier, we are not in the position to comment in detail to this chapter, as it is more relevant for operators. However, as we were impacted like other manufacturers after some license auctions on 3G in the recent years with extremely high license fees, we want to express from our experience that high pricing of spectrum will backfire into the economy of a country as a whole: it will impact capital investment, work places, software industry and innovation in general. Thus we would like to create awareness on how sensitive spectrum pricing is for the industry as well as for the economy of a country.

Siemens as a manufacturer and large investor in research and development operating software developments in India and in other states in the world sees spectrum policy as a strategic tool for the government to guide the industry and play a catalytic role for generating capital investment into research and development of new products and infrastructure deployments.. This means in the context of 3G: software development in new fields which are related to a new market, to mobile data and mobile multimedia. For example, there are the areas of mobile commerce, location based services and mobile virtual reality with video and data combined in real time. Intelligent mobile agents are developments which are connected with this new field of mobile services and applications.

Siemens ICM is therefore convinced that the upcoming decisions after this Consultation will be of great importance to the Indian telecommunications market and also to its prospering software industry. The Consultation indicates in Chapter 2.6.2 two ways into the future, dependent from spectrum decisions in India:

- a) the 2G spectrum is extended into the IMT 2000/3G bands (introduction of N.A.s PCS spectrum plan). This would be a decision for keeping the status quo in mobile communications, because it blocks the entrance of the real 3G technology (e.g. WCDMA with HSDPA etc.) and will therefore slow down new industry developments.
- b) The IMT 2000/3G spectrum is opened up via separate licensing to operators and stimulates new developments in India, specifically stimulates new software industry. India will join the leading countries in mobile communications in the Asian-Pacific region. It will benefit from a new competition field which will be opened up via 3G technologies and services. The positive impact on the Indian market should not be neglected.

From the Siemens ICM point of view, the choice can only be Alternative b). Siemens ICM therefore recommends to TRAI

?? to open the 3G spectrum via licensing to operators.

Siemens ICM is convinced that this will be the right decision for the timeframe of the next 5 to 10 years in India.

**Answers
to issues submitted for consultation in the Chapter 7
of consultation paper**

Chapter 2: Current spectrum availability and requirement

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

As it is known, there is for rural area coverage generally low capacity needed and therefore more operator spectrum available then used. Thus, in deciding whether or not to assign the spectrum to the operators, the regulator should check before what other potential demand there is for the spectrum e.g. for PMR/PAMR use and balance the interests of all market players. In any case, such spectrum should be assigned in a technology-neutral way. Also, any assignment shall be avoided that would have a destructive effect on the future assignment of other use in the same band – such as in the IMT 2000 band.

The 450 MHz band is not ITU-R globally harmonised band for cellular applications, which restricts roaming, economics of scale and competition.

In case of a TRAI decision to utilise the 450MHz band for the build-up of new public cellular 3G networks like CDMA 1x EV-DO, the alternative is to go into licensing of IMT 2000 bands in order to balance out the playing field between CDMA and GSM operators, because it is 3G related to higher bit rate data services. We further suggest introducing license conditions which are harmonised with the existing regulations, especially to make the licenses technology neutral.

Our Recommendation is:

The claims by CDMA operators that further spectrum is needed, requires careful consideration. The performance of the CDMA operators in the market is highly variable. Usually there is spectrum left over for rural applications.

- a) If operators can show that they have fully exploited any existing spectrum assignments (i.e. that they have built the maximum practical number of base stations to utilise their existing assignment), it would make sense to analyse the possibilities of exploring the 450 MHz band for cellular use.
- b) However the TRAI should evaluate other spectrum users, because especially the 450 band is generally allocated for PMR/PAMR applications.
- c) If CDMA technology belongs to the IMT-2000 family (CDMA-2000 1x EV-DO or EV-DV) we recommend using the IMT-2000 frequency arrangement B1 according to ITU-R M.1036, frequency arrangement B1.

Given the high number of competitors in the market, and the low level of tariffs, the consolidation among CDMA operators is likely.

This would change the supply and demand relationship for CDMA spectrum dramatically. The TRAI might well find that, in the event of consolidation within the CDMA sector because of financial reasons, and spectrum has returned to it, which it can subsequently assign to the operators in the market with the greatest need. This approach would be better in the medium to long term, than permanently cannibalising other spectrum bands just to meet an as yet unjustified need.

- (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.

In comparison to developed markets we estimate that in five years from now we will be facing slightly lower levels of traffic density – say about between 40 to 60%.. In those countries, mobile penetration rates are today between 60 to 80% , seven European countries have more then 90 % , their frequency assignments per operator tend to range from 2 x 10 MHz to 2 x 25 MHz. Some countries have still less then 10MHz assigned. In Western Europe for example, the number of subscriptions are far beyond forecasts made 5 years ago, instead - the calculated spectrum demand is actually lower due to the technology innovations in the networks and terminals as well as because of smaller cell sizes for outdoor to indoor coverage. Given the low tariffs in India, the corresponding high levels of mobile usage and the technology innovations as they are described in Annexure E of the TRAI Consultation, we believe that each GSM operator will be able to operate its network for voice and low to medium speed data with the amount of spectrum which is warranted in the license conditions assumed, that its market share would not be to far away from today’s percentages. Further, if we take into account, that - in a five years timeframe - 3G/WCDMA would be introduced, the WCDMA or CDMA 2000 radio expansions of mobile networks in India will provide far more traffic capacity then 2G networks have today, and that portions of data and voice traffic will be taken over by 3G, we believe there will be sufficient capacity reserves even far beyond the 5 years timeframe..

On the 3G services side, the market forecasts are still uncertain. The forecasts and analysis made from the GSM industry in the UMTS Forum based on international traffic models have shown, that the minimum spectrum bandwidth per 3G/IMT 2000 operator is 2 x 10 MHz, the optimal start-up bandwidth is 2 x15 MHz + 5 MHz(unpaired). Most of the 130 IMT 2000 licenses resulted in this amount of spectrum. For India, this means that at least 2 carriers should be considered per operator so that hierarchical networks can be deployed by six carriers, if the IMT 2000 harmonised “Core band” from 1920 -1980 MHz/2110 -2170 MHz duplex is used. For these reasons we consider 2 x 15MHz + 5 MHz of IMT-2000 spectrum to be the minimum required per operator or at least 2 x 10 MHz in India for evolution to IMT-2000 from GSM.

Our Recommendation is:

The IMT 2000 band arrangement acc. to ITU-R M.1036, frequency arrangement B1 should be allocated soon in order to prepare the Indian operators for a market growth, which goes up to a similar penetration level as in developed markets today. The 450 MHz option should be analysed in parallel to the license assignment of the IMT 2000 Core Bands.

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

The so called “IMT 2000 Core Bands” are the bands in the 1900/2100 MHz range for which the 3G technologies are developed today. The band plans in Korea and Japan as well as network deployments show, that this is not only the case for WCDMA but also for CDMA 2000 products. Additional IMT 2000 bands which were identified by WRC-2000 are the bands 806 -960 MHz (they differ between countries and regions), further the bands from 1710 - 1885 MHz and from 2500 - 2690 MHz. We participate in the regulatory discussions on frequency arrangements in these bands on the regional and global level, the focus is on harmonisation of using the 2500 - 2600 MHz e.g. regarding uplink/downlink direction, duplex or simplex, duplex gap etc. As Europe and meanwhile also the U.S. are considering these bands for cellular mobile use in more detail, we envisage these bands as the main extension bands for 3G and will therefore take them into our considerations for one of the next development steps for future product lines. The preparatory work for

WRC-07 gives a clear signal to the mobile industry to start development for such frequency bands. Therefore we are concerned that India would think about whether it would be appropriate to decide in the short-term for an expansion of the IMT 2000 Core Band into the 1710 – 1880 MHz range.

Our Recommendation is:

Whilst the allocation of GSM1800 to 3G/IMT-2000 may be desirable to achieve in the long term higher spectral efficiency, it is not a solution for the short term to introduce 3G services in India. It will be some time before the industry will develop WCDMA products for this frequency range and that operators worldwide introduce WCDMA into GSM1800 spectrum, therefore handset scale economies would not be available at the time of an expected network launch in India. Thus – the IMT 2000 band should not be expanded as a whole into the 1710 to 1880 MHz range. The frequency arrangement in the 1710 to 1880 MHz bands should stay as it is – and assigned for 3G use harmonised worldwide.

- (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 shall be considered separately from 2G spectrum. From a service point of view, IMT 2000 spectrum use should be allowed for new advanced services as well as for extension of existing mobile services and fixed services(e.g. XDSL substitute) towards 3G capability (higher bit rates, QoS, shorter round trip delay, better spectral efficiency, real-time video etc.) in the understanding of a service evolution. It shall be treated in line with the internationally preferred and harmonised frequency arrangement according to ITU-R Recommendation M.1036, frequency arrangement B1 (Consultation Paper, Chapter 2.3, TABLE 2) allowing all IMT 2000 technologies (RTTs). The IMT 2000 spectrum will allow Indian operators to introduce a high-speed radio overlay network to their existing mobile networks enabling them for service evolution. The evolution encompasses the ability to provide access to both 2G and 3G networks. Data cards for Laptops provide mobile radio access similar to fixed broadband access (xDSL). Other customers will be sold dual-mode phones; they will be unaware of which bands are used to deliver which services.

Please also take into consideration that frequency arrangements B5 and B6 in the TABLE 2 of the Consultation Paper were designed for Recommendation M.1036 by ITU-R WP8F at the time when USA were in process of consideration of their spectrum arrangements for IMT-2000 systems. Now USA decides for spectrum arrangement 1850-1910 MHz paired with 1930-1990 MHz and 1710-1755 MHz paired with 2110-2155 MHz for their Advanced Wireless Services (AWS). Therefore the frequency arrangements B5 and B6 are out of date and ITU-R WP8F will probably modify that table in the M1036-2 by the occasion of ongoing process of recommendation's modification concerning the spectrum arrangement in the 2.6 GHz band.

That actual status of spectrum arrangements for IMT-2000 systems stresses the necessity to implement the frequency arrangement B1 of TABLE 2 because it is only one reasonable for construction of user equipment with minimized number of implemented frequency bands and of operational modes, which is a prerequisite for global roaming available at low costs to customers and operators.

There are already more than 4 million WCDMA users enjoying 3G service evolution in over 25 fully operational networks in 2G compatible environments. The take off of WCDMA went faster than ten years ago GSM. The annual shipments of base stations in the year 2004 are expected to be more than 60.000 worldwide.

Our Recommendation is:

IMT 2000 spectrum should be considered separately from 2G. The licenses shall allow for service evolution and should be treated within the worldwide harmonised spectrum arrangement according to ITU M.1036 frequency arrangement B1.

- (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 utilisation of spectrum. Please suggest the ways and means to achieve it.

We understand this process is already underway and we support this process and its intentions, to reduce guard band loss and to facilitate the radio planning of the operators.

- (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 band 1880 – 1900 MHz should be kept 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 in India. Each system is self organising and is allowing public and private residential systems to co-exist. It is focussed on the cordless delivery of cheap fixed telephone and data services. DECT belongs to one of the ITU RTTs and therefore fulfils the IMT 2000 technical requirements. It fully supports ISDN access for voice and data and data cards are available using the USB interface on desk top PCs and Laptops. Equipment is widely available in the country and worldwide, because this frequency band is more or less globally harmonised. It is placed correctly in the IMT 2000 bands.

There are now estimated more than 250 million residential cordless telephones worldwide that use the DECT standard. If the 1880 - 1900 MHz band would be allocated for mobile use, then the TRAI might be obliged to clear these unlicensed users from the band to prevent interference. This would be an unrealistic task given the ease with which globally manufactured equipment can enter the country.

Our Recommendation is:

The TDD frequency arrangement in the 1880 – 1900 MHz band should not be changed.

The 1880 – 1900 MHz band paired with 1970 – 1990 MHz would be a specific Indian frequency arrangement being not in line with worldwide harmonised use of IMT 2000 technologies – thus, it would require specific technology development with a new duplex distance of 90 MHz. The upper band 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 compatibility between GSM1800, DECT and IMT 2000 allocations, it would be counter-productive to introduce such frequency arrangement.

Chapter 3: Technical efficiency of spectrum utilisation

- (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.

The detailed study on spectral efficiency, as outlined in the Consultation, tries to compare different technologies by taking into account operator planning parameters. We understand the the aim of TRAI to find an equal level for comparing technologies in differently built networks according to different business models. As Siemens ICM has done many comparisons of spectral efficient technologies over many years, we see many difficulties if operator specific radio planning parameters are mixed with technology related ones. For example, we use spectral efficiency per radio cell. In this case, BW the base station (BS) density or number of BS per serving area or cell size has no impact. In contrast for the spectrum efficiency related to square kilometres a clear definition of a cell site is needed. If we reduce the cell size by a factor of 3, the radio capacity goes up by a factor of 9. The used methodology applied different cell sizes to the compared technology which clearly leads to different results when capacity is related square kilometres. Furthermore, the theoretical GSM spectrum utilization has been calculated with old-fashioned planning rules (e.g. re-use 9 for TCH TRX) while modern GSM systems using fractional loading and frequency hopping are deployed with re-use 1 for TCH TRX (note: not for BCCH TRX) as currently carried out in Cingular networks. It has been clearly shown that the achieved spectrum efficiency is comparable or with additional new features like "Dynamic MAIO Allocation", "Single Antenna Interference Cancellation" even superior to CDMA 1xRTT. If we consider data services, we are not using ERLANG, because its applicability to packet data is questionable. We mean that spectral efficiency is very much dependent on economical factors: the operator business model is the basis for the investment into the radio network; a new entrant usually focuses on coverage keeping the no. of sites small, while an incumbent operator concentrates on capacity and outdoor to indoor coverage, thus investing in micro and pico cells. The trade-off between amount of spectrum and investment is an issue, which cannot be dealt with from outside the operator organizations. A further viewpoint, which determines spectrum requirements, is the operators' market share: while in the start-up phase equal amount of spectrum is justified, it can be the opposite in a developed market, where operators with large market shares, say 40% operate their networks with the same amount of spectrum compared to the operators with market shares of 10% and less. This can be observed in many developed markets.

Related to the comparisons in the Consultation, we would like to note, that according to the parameters used in Chapter 3, there seems to be no need to allocate more spectrum for voice services then promised in the licenses. We have seen by our analysis of large operators in developed markets, that 2 x 15 MHz for 2G/GSM systems is a sufficient bandwidth even up to penetration rates in the order of 90% per country. We have not seen growing amount of assigned spectrum with growing individual market share of the operator. The calculations in the Consultation document show – under the assumptions made for CDMA operators - that they have large capacity reserves, if they invest stepwise by increasing the number of cell sites. According to our observations, the number of CDMA sites in India in the field today is rather small in contrast to the GSM operators' investments. Another view has to be taken, if additional spectrum is discussed for CDMA2000 1x EV-DO deployments. Here, the IMT 2000 spectrum according to frequency arrangement B1 in Chapter 2.3/TABLE2 would be the better choice in order to reach a harmonised competition field. IMT 2000 spectrum could be granted in an equal partitioning to operators independent from their technology choice. All the major 3G technologies are developed for these bands, specifically for the worldwide harmonised band arrangement B1, acc. to ITU-R Recommendation M.1036.

If CDMA operators are allowed to deploy CDMA 1x EV-DO it would mean that one or two operators are allow to deploy IMT-2000 networks, which would be against fair treatments, because GSM operators could not enter their evolution path to 3G.

- (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?

Recently, an interesting trend towards symmetric traffic has been observed. File sharing, whether legal or not, and interconnection of game consoles, is expected to generate the bulk of Internet traffic in the future. The mobile industry is following suit by encouraging customers to generate traffic themselves. MMS and video calls are typical examples. Activities are being undertaken to standardize a walkie-talkie application. The mobile industry is already developing enhanced 3G (HSDPA with up to 14 Mbps) and fourth-generation mobile technologies where data rates up to 100 Mbit/s are being discussed for both the uplink and downlink.

In the future the convergent handheld terminals would be equipped to access both IPDC (IP Data Casting) services and point-to-point mobile services. The combined system would be built on the assumption that the user downloads much more data than he or she generates. This is called asymmetric traffic. Content is therefore mainly assumed to be generated by third-party service providers.

All that already observed developments on the services and applications market indicate that an easy access to inexpensive equipment is a prerequisite for fast introduction and for wide acceptance of new mobile telecommunication applications and services. The cost optimized equipment can be offered only then, when it has to operate in the minimized number of world harmonized frequency bands and within of interoperable standards.

Therefore our recommendation is:

to implement spectrum arrangements as in the TABLE 2, frequency arrangement B1, of Consultation Paper, which is optimized for the operating the symmetric traffic and contains also spectrum dedicated for potential unsymmetrical traffic.

Chapter 4: Spectrum Pricing

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

No comment

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

No comment

- (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?

No comment

- (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.

No comment

- (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 are introduced through pricing to encourage rural coverage and / or using alternative frequency bands like 450 MHz?

No comment

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

No comment

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

No comment

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.

We estimate that in 5 years from now, we will be facing slightly lower levels of voice traffic density as is currently experienced in developed markets elsewhere in the world. In those countries, GSM assignments per operator range from less than 2 x 10 MHz to 2 x 25 MHz. Most of the operators with penetration rates of 80% per country and 40% market share have between 2 x 17 -18 MHz bandwidth.

We therefore believe that we will require no more spectrums per operator than determined by the existing license contracts. This means that we support Approach I. However, as we envisage strong growth coming from the data side, we recommend making a strategic decision to release the IMT2000 Core Bands according to frequency arrangement B1 of ITU-R. The 3G technologies for these bands are available, the spectrum plan is harmonised and implemented already in more than 30 countries in the world, including those which are deploying both, WCDMA and CDMA 2000 radio networks. Interoperability is approved via commercial operation in many networks with more than 4 million users on the WCDMA side. WCDMA offers all services – with better spectral efficiency and quality – which are in use today in 2G/2.5G networks, in addition to multimedia services like videotelephony.

Our Recommendation is:

The minimum spectrum per operator is dependent on the technology choice of the operator, its radio network design acc. to the business model and on the basic service capability offered. The amount of spectrum is stated already in the Consultation, Approach I. 2G and 3G radio layers will complement each other, because 3G is not only for higher bit rate data services, it is also for voice with higher spectral efficiency and better quality. 3G spectrum should be given in equal portions to the operators - after market entrance, the market shares of the operators develop into different dimensions. The spectrum demand could therefore differ. However the practical side shows, those additional site installations are the better and faster way to improve network capacity than to allocate more spectrums. We recommend therefore to TRAI to go with Approach I and to prepare 3G spectrum with equal spectrum per operator for licensing.

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

The regulator should seek a balance between the number of operators that are allowed to enter the market and the amount of spectrum that each is assigned. 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 will inevitably be excessive competition and subsequent consolidation or exit from the market. The management of spectrum is therefore an important lever in achieving this balance. In many countries in the world it is shown, that more than four competing operator does not make much sense from an economical and spectrum point of view.

Our Recommendation is:

We believe that - with between six and eight competitors in most circles - the Indian mobile market is already over-competitive and there is no benefit in reserving spectrum for new entrants, because there will be mergers in the short- to medium term freeing up spectrum.

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

Spectrum should be allocated for mobile services in general but 2G and 3G licenses should be considered separately. The licensees should be free to choose which technology they deploy within the IMT 2000 framework standards (e.g. ITU RTTs or other region-wide standards). They will guarantee coexistence of radio technologies and allow interoperability.

From a standards point of view the IMT 2000 bands are practically seen technology neutral, because they allow 3G operators using mixed technology platforms which are defined related to relevant service requirements as ITU-RTT technologies.

Our Recommendation is:

Public mobile services should not be restricted in the license conditions. Technology neutrality should be kept within the ITU framework standards given related to their frequency arrangements.

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

Our Recommendation is:

We do not see a need to define a spectrum cap per operator, because each license process has certain conditions, which should not be changed afterwards. If it is decided to do so, the cap should be determined based on the technology that an operator has deployed, and its corresponding efficiency, plus some consideration of the level of viable competition that should be supported.

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

Our Recommendation is:

We recommend using the beauty contest procedure.

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

No comment

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

Our Recommendation is:

Instead of giving some spectrum in the 900 MHz band to fourth CMSPs, we recommend to introduce spectrum trading within the 2G bands in order to enable operators to negotiate an exchange of frequencies e.g. 900 MHz for rural and back 1800 MHz for urban use.

- (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 soon. We believe also that most operators will follow the same technology route adopted by the majority of mobile markets around the world, and implement W-CDMA. This radio technology operates on a 5 MHz carrier basis. On the ITU level it was worldwide understood that the IMT 2000 bands should be partitioned into 5 MHz blocks. All the 3G spectrum licenses in the recent past have taken this rule into account. Operators that have launched W-CDMA or are about to launch W-CDMA are using either 2x10MHz (+ 5 MHz) or 2x15 MHz (+5MHz). 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 x10MHz (+5MHz). The European licensing in 3G has shown, that finally no more than 4-5 operators should be in competition. Also, the example in Sweden shows, that –especially on the rural side - infrastructure sharing including spectrum sharing is recommendable.

Our Recommendation is:

Follow the UMTS Forum Recommendation of 2 x 10 MHz minimum spectrum per operator, which is elaborated in an analysis made considering mobile 3G services and bit rates (UMTS Forum Report no.5, www.umts-forum.org)

- (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?

The main intention in the ITU-R by creating IMT-2000 system family and IMT-2000 spectrum was to enable existing operators with mixed technology platforms to coexist and to enter seamless roaming for the benefit of the user. Further – to enhance the capability of existing mobile operators, by giving them the capability to offer higher speed services and support increasing traffic capacities. The vast majority of the IMT spectrum which is licensed worldwide has been assigned to existing 2G operators.

The definition of what services are offered in the IMT-2000 band versus 2G bands appeared to be academic – except for video telephony and in future IMS multimedia services. In the next years operators will deliver a mix of voice and data services over both IMT-2000 and 2G based on practical considerations such as the laptop data card and the increasing models of dual mode versus 2.5G handsets in the market.

Our Recommendation is:

We believe, to make a distinction from a service point of view today, between how IMT-2000 and 2G bands should be used is largely impractical. The IMT-2000 spectrum should be assigned according to the ITU framework standards for IMT 2000 and should be treated separately .

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 electronic equipment independent of application is becoming cheaper and therefore the producer's margins are decreasing continuously. That forces the industry to follow the standards or to create de facto standards for hardware, software and also for frequency arrangements. Also the governmental budgets are shrinking continuously. It is therefore reasonable to fulfil the infrastructure and defence duties as radiolocation, fixed wireless links, maritime and military communication etc. etc. within the frequency bands, which are world's most popular for the comparable services. That increases the system availability and decreases cost.

With this introduction we would like to deliver the main argument how to motivate the incumbent users to move from their spectrum to the more common one and to allow the implementation of mobile telecommunication services in the world wide harmonised frequency bands.

Other argument can be the contribution of mobile telecommunication to the Gross Domestic Products. In some countries that contribution from telecommunication sector is equal or already greater then for example from the automobile industry. The taxes coming from industries like telecommunication or automobile are financing other state expenses like defence or infrastructure. Therefore the administrations have the right and competence to ask other spectrum users to leave their spectrum. Offering the adequate compensation will

ease the decision making by affected users. The state duties and primary interests should not be violated by such processes.

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

Nowadays the states are developing and introducing the generic rules how to deal with ownership changes of frequency spectrum. Countries like UK ask every spectrum users for fees. Rules like administrative measures, fees, auctions, beauty contests, leasing etc. etc. if adapted to all spectrum users offer clear criteria to everybody inclusive broadcasting, military, public and private telecommunication. Since the optimization of spectrum use is becoming more and more necessary, it may be useful to develop such generic spectrum refarming rules first and then apply them consequently by ownership or service changes to all market players.

Surrender of spectrum

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

No comment

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

No comment

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

No comment

Spectrum trading

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

Siemens engagement in India, likely as in any other country, takes into account its international experience in order to assist for finding the best solutions in interest of the country. Thus welcomes the TRAI consultation as it contributes to planned, transparent and harmonised legal and regulatory approaches. The use of radio spectrum is a key component for new developments in the communications sector. Quality and continuity depends on stable rules and regulations.

The introduction of spectrum trading is basically a political decision. In our opinion, spectrum trading should lead to spectrum consolidation, not to further spectrum fragmentation. It is useful to observe the international trends before making the Indian decisions.

Spectrum trading should be only introduced for achieving of more efficient and flexible use of spectrum but only in the framework of ITU-R harmonised spectrum arrangements. Spectrum speculation must be avoided.

Therefore if spectrum trading is to be introduced, the involvement of a neutral body such as the Regulatory Authority in charge is crucial.

Regarding license exempt spectrum, we support the view to exclude it from trading.

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

All processes dealing with spectrum allocation should be transparent, non-discriminatory and equal to all. The spectrum foreseen for trade should be clearly distinguished from other spectrum.

Therefore based on the country specific frequency table it would be useful to publish a country specific frequency assignment table accordingly in order to see who has licenses of which frequencies. Such instrument should be provided in order to enable the administration to create or to extend its database. Furthermore the administration should think about installing a trade register and a price database that would make clear who paid what for which frequencies.

The scope of the trade would be important information as well as if a change of use or a reconfiguration is in the scope of the trade.

Furthermore a list of interested participants, in other words licensees who are interested in doing a trade, as well as information about measurements of efficient use of spectrum should be made available.

The efficient use of the available spectrum should be monitored. With regards to efficiency, spectrum management authorities should have a fundamental interest in the re-allocation of spectrum resources. Where spectrum consolidation is a target, fragmentation in frequency assignment tables are to be avoided. We see spectrum management authorities in charge of granting and ensuring adequate terms and conditions for spectrum re-allocation. The involvement of a neutral body such as the spectrum management authority is crucial.

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?

No comment

(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?

No comment

(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?

No comment