ClearMobitel

A Response

To

The Telecom Regulatory Authority of India's Consultation:

"IMT Advanced Mobile Wireless Broadband Services"

Consultation Paper No. 6/2011

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1. Introduction.

Clear Mobitel Ltd has pleasure in responding to a consultation paper issued by the Telecom Regulatory Authority of India (TRAI) entitled, "*IMT Advanced – Mobile Wireless Broadband Services.*" The company states for clarity that it has no objection to this entire document being published in any format the TRAI feels is appropriate.

Clear Mobitel is focussed on the design, build and operation of pure so-called 4G mobile networks around the world. Currently it has businesses in the U.S, U.K and New Zealand. The potential to deliver breakthrough Internet services at previously unattainable speeds via a next generation mobile network platform is already a reality due to the awarding of spectrum in the U.S and European states for 4G mobile networks. The pre-eminent technology platform of choice for operators who have already begun to deploy is that of Long Term Evolution (LTE) radio. LTE has the capability to out perform other technologies on many levels and is the technology of choice for Clear Mobitel. However such technology and the evident advantages it can deliver over legacy 2G and 3G technologies is of little use to society as a whole, if the benefits of such technology cannot be realised by all. Across the world, there is an urgent need for high speed broadband to be extended into not-spot and slow-spot areas, which predominantly exist in the rural environs. Even in a developed country such as the U.K, there is a sizeable block of population that is suffering disadvantage caused by the lack of high speed broadband – the so-called '*digital divide*'. As a result of the digital divide, people and communities cannot develop economically at a pace commensurate with the economic demands of the 21st century. This leads to lack of development and ultimately impoverishment for those in such communities. Clear Mobitel states that in its view, it is simply unconscionable that high speed broadband is not available to all in the 21st century. By the TRAI's own admission, broadband penetration in India is very low and Clear Mobitel agrees with the TRAI that it is right to seek to address the problem in any forthcoming auction of available spectrum for IMT Advanced (IMT-A) mobile networks. Further, Clear Mobitel asserts that it is an ideal opportunity for the Indian government to seek to address its social policy objectives aimed at ensuring that the rural populous enjoys the same broadband advantage that those who live and work in India's major population centres enjoy. Clear Mobitel wishes to express its substantive views on many of the issues the TRAI raises in its consultation paper. Such issues are commonplace in other regulatory jurisdictions and much effective work has been done already to address

them, not least through auctions that have already occurred for such spectrum and which the TRAI has cited in its consultation for IMT-A mobile networks.

Responses to Questions in Chapter 1:
Overview of IMT-Advanced Systems

Response to Q1)

In Clear Mobitel's opinion there is no need for a regulator to make such defined requirements prior to any future auction of spectrum. Vendor equipment is on the whole standards specific when it comes to market and the choice of both vendor and technology should be left to market forces i.e. the licensee. This follows the fact that licenses are to be awarded on a technology-neutral basis by the TRAI and by inference licensees are free to make the technology choice.

Response to Q2)

Clear Mobitel would refer the TRAI to its response to Question 1.

Response to Q3)

Clear Mobitel declines to provide a specific response to this question by the TRAI except to state clearly that it believes strongly that innovative, standards-based security solutions that are currently being developed should be deployed in all such future mobile networks in India.

Response to Q4)

Clear Mobitel respectfully draws the TRAI's attention to its response to Question 3.

Responses to Questions in Chapter 2:
Regulatory Issues in IMT-Advanced Systems.

Response to Q5)

Clear Mobitel believes the TRAI should identify the following spectrum bands for IMT-A services:

- The 700MHz Digital Dividend band (*698MHz – 806MHz*).
- The 2600MHz band – (*2500MHz – 2690MHz*).

As the TRAI recognizes in its consultation paper, both these bands are internationally harmonised for the deployment of future services (4G) mobile networks. The 700MHz band has already been auctioned off by the Federal Communications Commission (FCC) and indeed operators have begun deploying high speed LTE mobile networks in the band in the U.S. The same can also be said of the 2600MHz band in Europe. It is Clear Mobitel's view that in order to be regarded as a competent national wholesale provider, an entity would need allocations in both bands in order to serve both high density urban and low and medium density rural zones. A further advantage is afforded by identifying these bands for IMT-A services in India. Currently there is a plethora of user end devices available that function with mobile networks operating in both these bands. This is an important factor in considering which bands to adopt for IMT-A use, as it will speed up customer subscription and take up of services on such networks.

Response to Q6)

Clear Mobitel believes the minimum block size of spectrum in a future auction should be 10MHz (in both and FDD and TDD block context). It is commonly acknowledges that the larger the contiguous block of spectrum, the better the spectral efficiency and the higher the cell throughput. On that basis, it makes little sense to divide the available spectrum up into small blocks (5MHz) that do not fulfil either licensed entity's or ultimately the end user's requirements or expectations - to deliver quality high speed broadband services.

Clear Mobitel believes the right approach in a forthcoming auction would be to make available a number of high power spectrum lots with an obligation to deliver a national rollout, with specific coverage obligations in-built into the licenses. All such lots should carry specific coverage obligations related directly to population statistics rather just geographic areas. Further such licenses should be mandated to support wholesale network access to

both virtual network operators (VNOs) and sub national radio access network (SRAN) providers. Further the TRAI should also nominate specific spectrum lots for low power use by local retail entities. In this way strong market competition to the benefit of the consumer is fostered.

Response to Q7)

As stated in the response to Q6, Clear Mobitel states that the minimum block size for effective deployment of 4G networks should be 10MHz (in both an FDD and TDD block context).

Response to Q8)

In order to respond to this question from the TRAI, Clear Mobitel believes the correct approach by the TRAI should be to ensure that there is no risk of over-concentration of sub-1 GHz and total spectrum holding that is licensed for mobile use by any entity either currently or future operating in the Indian mobile market.

The TRAI should first examine the entire current licensed spectrum holdings of any currently licensed Indian mobile operator intending to enter a future auction for such spectrum. The TRAI should use the result in each instance as prequalification criteria for a bidder to acquire further spectrum as a result of such a future auction. The TRAI should assess the spectrum holdings of an existing Indian mobile operator in 2 ways:

i) What sub-1 GHz spectrum holdings does it already hold that is either licensed for mobile operator use or is in any way liberalised on a technology-neutral basis for mobile use?

ii) What licensed/liberalised for mobile spectrum does an individual bidder hold overall?

By conducting such an assessment, Clear Mobitel believes that the TRAI can properly benchmark each individual bidder's spectrum holdings prior to an auction process. In terms of identifying appropriate spectrum ceilings for a future auction, Clear Mobitel believes that those set by Ofcom in its "*Consultation on assessment of future mobile competition and proposals for award of 800MHz and 2.6GHz spectrum and related issues*", dated March 22nd 2011 , the UK communications regulator are appropriate, namely:

- Sub 1 GHz mobile spectrum holding: **2 x 27.5MHz**
- Overall total mobile spectrum holding: **2 x 105MHz**

Clear Mobitel believes it is important that the TRAI does not allow a situation to develop in any future auction for such mobile spectrum where a 'free for all' is allowed to ensue. The company's view is that an appropriate holding pre and post any future auction for mobile spectrum should be as shown above.

Response to Q9)

Clear Mobitel does not believe there is any need for the TRAI to specify specific duplex scheme based on either band or mode (TD/FD LTE) of transmission. These two duplex schemes provide deployment flexibility according to operator preference and spectrum allocation.

Response to Q10)

Clear Mobitel agrees with the TRAI that spectrum is a scarce, and therefore valuable natural resource. What value the TRAI puts on spectrum should indeed reflect these attributes as well as the perceived value (*through the introduction of new services*) to the marketplace. There can be no doubt that sub-1 GHz spectrum is far more valuable than above-1 GHz spectrum and the reserve value should reflect this. Based on current market valuations for such spectrum, Clear Mobitel's assessment of spectrum value is as follows:

- 2 x 5MHz (sub-1 GHz FDD high powered national license per lot) - $150,000,000.00
- 2 x 10MHz (2.6GHz band FDD high powered national license per lot) - $20,000,000.00
- 2 x 10MHz (2.6GHz band FDD concurrent (10 users) low power national license lot) - $20,000,000.00
- 1 x 50MHz unpaired (2.6GHz band TDD individual high powered national license lot) - $20,000,000.00

Response to Q11)

Clear Mobitel believes that there are 2 key eligibility conditions bidding entities should be mandated to comply with in order to take part in a future auction for mobile spectrum in India. Firstly, a bidding entity must be able to clearly demonstrate to the TRAI that it has the financial and project execution capability to bid seriously in a future auction. This should take the form of providing financial statements from investment bankers/investors in the bidding entity, as well as a statement of financial ability from the relevant board of directors of the bidding entity. The bidding entity should also clearly demonstrate the viability of its business planning for the national rollout of 4G network within a specified (agreed) timescale after an auction has occurred. The former is a normal requirement to enter such auctions and bidding entities should be fully acquainted with providing such detail. The latter ensures that a bidding entity cannot simply hoard bandwidth spectrum that has been won in any future auction, i.e. bid and win spectrum in a future auction without a substantive, timescale-constrained rollout and deployment strategies being in place. Clear Mobitel also believes that bidding entities should provide a competitive impact statement to the TRAI of the predicted effect of their securing further/new spectrum will have on future competition in the Indian mobile market. We think this of particular importance given the likely current spectrum holdings of existing licensed mobile operator entities in India. Clear Mobitel strongly believes that the release of further spectrum to the marketplace for IMT-A mobile networks should result in both increased coverage and competition intensity.

Combined Response to Q12 & Q13)

Clear Mobitel asserts that it is in the interests of both the population of India as a whole as well as making full and efficient use of spectrum acquired as a result of a future auction, that roll out obligations be placed on spectrum targeted for future mobile use. As was referred to in the response to Question 11, Clear Mobitel firmly believes it is a prerequisite to mandate such a policy prior to permitting any potential bidder to enter a future auction for mobile spectrum. In short, it is the view of Clear Mobitel that an entity's ability to finance itself in a competitive auction should not be the only consideration when considering suitability as a future mobile operator licensee. The TRAI has in 2.41 acknowledges that rural broadband penetration is low. The TRAI is therefore right to seriously consider the rollout obligation policy adopted by the German regulator (*Federal Network Agency*) when it released spectrum for future 4G mobile networks. The regulator not only placed strict rollout obligations on successful bidders, it also put in place strict spectrum caps to take account of

existing licensed entities mobile spectrum holdings, prior to the auction. These measures are vitally important to ensure an efficient auction outcome that benefits the entire Indian population. Clear Mobitel has presented its views on the need for spectrum caps in its response to Question 8. The German regulator's approach to the issue of rollout obligations was in itself unique. It effectively turned the priority for rollout on its head by placing what arguably are the most uneconomic rural zones at the top of the priority list, with the most commercially attractive build out areas last. This places a very effective coverage obligation on successful bidders prior to the auction taking place. Given the physical properties of the different bands available, Clear Mobitel argues that such obligations should be placed on successful bidders by the TRAI on sub-1 GHz spectrum acquisitions in a future auction. Further, if the TRAI decides in its wisdom to liberalise other bands currently used for 2G/3G mobile services for future 4G IMT-A mobile use, Clear Mobitel believes the same rollout obligations should apply as those for newly-available spectrum in order to prevent existing mobile operators from 'cherry picking' the market in commercially viable locations first, such as large towns and cities throughout India. We would however caution the TRAI on engaging in a 'liberalising free-for-all' on sub-1 GHz spectrum ahead of a future auction of new spectrum, as this may have the deleterious effect of stifling new competition in the mobile market.

Previous auctions in the U.S and Europe have clearly demonstrated that sub-1GHz spectrum bands are highly sought after by mobile operators. This is not surprising given their superior propagation and penetration properties over frequencies higher up in the UHF band e.g. the 800MHz band compared to the 2.6GHz band. The sub-1 GHz band is the default choice for peri-urban and rural rollout of future mobile networks by operators. That in mind, Clear Mobitel asserts that it is entirely appropriate for the TRAI to apply extensive coverage obligations to new sub-1GHz spectrum that may be auctioned in the future. The TRAI should look to apply coverage obligations that specify the minimum outdoor and indoor coverage that a successful bidder is expected to meet (expressed as a percentage of the total population). In this way, Clear Mobitel believes that all sub-1 GHz spectrum secured as a result of competitive auction will be efficiently deployed to the benefit of the entire population of India. The coverage obligation should extend to as near 100% of the total population as technically and commercially possible.

Securing sub-1GHz spectrum in a future auction confers a great deal of capability on a successful bidding entity to provide lucrative revenue-generating services to the Indian mobile market. In order to ensure strong competition going forward, it is important that the TRAI considers how to maximise the benefit to the population in general. Clear Mobitel believes that successful bidders should be under strict license conditions to open up their IMT-A mobile networks to wholesale competition, thereby facilitating virtual network operators (VNOs) access to the available spectrum. Operators that have secured sub-1GHz spectrum holdings should also be mandated under license condition to open up their mobile networks to competitive operators under commercially attractive roaming agreements. In this way, the full benefit of the spectrum is maximised to the benefit of the Indian consumer and not just to the licensed mobile operator.

Response to Q14)

It is vitally important that when considering how to charge for spectrum post a future auction of spectrum for IMT-A mobile networks, the TRAI does not de-incentivise the future high speed mobile market with potentially high fixed spectrum charges from the outset. Given the likely significant investment needed for both the auction bidding and subsequent rollout of such networks, Clear Mobitel believes a revenue share model with the government will deliver a more efficient outcome for all. In this way, the TRAI is entitled to a significant share of revenues generated over the term of the license by virtue of the fact the Indian government owns radio spectrum *per se*. However such a model affords the advantage to the licensee of not unduly front-loading the operational cost base which could negatively affect a rapid network build out. As a safeguard, the TRAI could fore example write into individual licenses the ability to demand fixed payments if agreed customer revenues are not achieved, i.e. the acquired spectrum is not being used efficiently by an individual operator. This revenue-share methodology has an additional benefit of incentivising an operator to accelerate network build out which is of overt benefit to the population of India.

Response to Q15)

No response given.

Response to Q16)

The TRAI needs to ensure that operators of IMT-A networks can provide voice services. This must include the requirement for such operators to support carrier service fallback (CFSB) for the foreseeable future. As indicated the response provided to question 17, Clear Mobitel asserts that it is likely voice services will be handled in this way until the coverage of LTE-A or similar 4G networks is comprehensive. Operators should also be mandated as a condition of their license to provide emergency services voice coverage wherever they have built out. This must be traceable to a PSTN numbering scheme. In other words, IMT-A operators will need to have PSTN mobile numbering ranges assigned to their individual networks. As part of this, the TRAI should conduct an audit of number take up on an annual basis, which is standard practice for the regulator community.

Response to Q17)

Clear Mobitel strongly believes that interoperability between IMT-A systems and legacy 2G/3G systems should be left to market forces. Given the number of consumers currently connected to 2G/3G service networks, the support of voice services and the general matter of migration to 4G, it is inconceivable that new 4G mobile networks will not need to interoperate with such legacy infrastructure. In the early stages of the introduction of 4G infrastructure, coverage is likely to be patchy as build progresses and the need for handsets to default to 3G for coverage and roaming will be necessary. New 4G mobile networks will therefore need to interoperate seamlessly with existing 2G/3G networks in the interim. It is envisaged that voice and data will be able to coexist together on the same handset with voice transiting on 3G (via circuit switched fallback) and high speed data on 4G. Over the rollout period, once the LTE network footprint is complete, operators will be able to fully migrate voice onto IP voice over LTE (VoLTE) supported by IMS. This example alone shows why the TRAI can leave interoperability of LTE-A with 2G/3G networks to market forces. It is quite simply put, a fundamental necessity in the early stages of the implementation of 4G infrastructure.

Response to Q18)

3GPP Release 10 is an IMT-A (LTE-A) compatible specification and encompasses the requirement for such networks to be self organizing networks (SONs). SON capability will not only deliver significant OPEX savings to operators of such networks, they will bring dramatic improvements in network optimization, monitoring and restoration/reconfiguration

capabilities. It is generally recognized that given the likely size and complexity of LTE-A networks, hybrid SON architecture will be needed to optimize and manage the network effectively. Hybrid SON will introduce new key performance indicators (KPIs) as well as improve well known KPIs used to measure the performance of existing legacy 2G/3G networks. Clear Mobitel foresees the following KPIs being amongst the cornerstones for measuring and self-optimizing such LTE-A networks:

- Mean user throughput.
- Cumulative density function throughput.
- Normalised cell edge user throughput.
- Inter/intra RAT handoff performance (heterogeneous networks).
- Connection setup latency.
- Radio access transmission latency.
- Handover interruption time.
- Control channel overhead.
- Packet flow establishment time.
- Session rejection rate for new sessions.
- Session drop rate for ongoing sessions.
- Automatic neighbour optimization.
- Cooperative multipoint transmission optimization.
- Automatic interference reduction (including EIRP reduction between adjacent eNBs).
- Automatic handoff optimization (adjustment of C/I and RSSI).
- Automatic Transport QoS optimization.
- Automatic e-Node B (eNB) power saving optimization.

Response to Q19)

a) Introducing femto cells into macro cell architecture significantly increases both the number of eNBs in a network and consequently the challenges in maintaining network control and management. Whilst femto cells can improve network performance overall and improve customer services, they need to be very tightly controlled. The ability for a network to self optimise through hybrid SON management capability becomes mandatory. If hybrid SON management capability is not present in such deployments, there is a potential for catastrophic interference with the existing macro cellular infrastructure as well as existing femto cell

deployment in the near vicinity and therefore cause a significant degradation in KPIs. To overcome this, femto cells have to be automatically configured by the SON management system, taking account of their impact on neighbouring cells. There is an implicit need to authenticate and identify each femto cell deployed before permitting it to transmit in the licensed spectrum. In this way, the SON will control what band the femto cell transmits in e.g. 800MHz/2600MHz and also at what EIRP to ensure its does not interfere with neighbouring cells and therefore affect KPIs in the network vicinity. SON will play a key role in ensuring that femto cells introduced into an existing LTE structure will enhance quality of coverage and throughput for the consumer, not seriously degrade it.

b) There will be a major impact on radio spectrum policy with the introduction of femto cells and in LTE-A terms Type I and Type II relay stations (RSs).The introduction of such devices could lead to a choking off of mobile traffic due to the overload in the allocated licensed spectrum in traffic intensive zones such as towns and cities in India. In effect IMT-A networks become 2 tier networks; the macro cellular network and underneath it the femto cellular/RS network. LTE-A SON will greatly assist in the implementation and optimization of such networks, however there will continue to be a major issue with spectrum use/reuse overload leading to significant degradation in network KPIs and poor customer service/experience, even with the large increase in spectral efficiencies that IMT-A systems will deliver. Clear Mobitel believes that the TRAI should package spectrum in such a manner that bidders into a future auction will be bidding for both penetrative sub-1GHz spectrum (700/800MHz band) lots and also less penetrative but more ubiquitous above-1 GHz spectrum lots such as the 2600MHz band. The ability to deploy in at least two separate bands, particularly in the example provided in the 2600MHz band, where there is far more spectrum available will ease the problems of dense macro/femto cell/ RS deployments. In order to achieve this aim, the TRAI will need to ensure that all mobile spectrum allocated to existing licensed operators is being efficiently deployed, particularly if it is being earmarked for liberalisation for future 4G use.

c) Such IMT-A system deployments using femto cells will actively help in promoting network sharing (*via wholesale roaming agreements*). Infrastructure sharing in

future networks is to be welcomed as it promotes strong competition to the benefit of the citizens of India.

d) The TRAI should approach a future spectrum auction for IMT-A networks ensuing that it embeds the following requirements for the development of next generation mobile:

- A spectrum audit of all currently allocated mobile spectra to ensure they are being efficiently used and not hoarded by licensed operators. This is particularly important for sub-1GHz bands for use in future IMT-A compliant networks.
- Auction of both sub and above-1 GHz spectrum to properly support the development of high capacity, high availability IMT-A networks.
- Deployment of 3GPP Release 10 compliant technology that supports SON. This will ensure network optimization and therefore power-related efficiency.
- Specific guidance on the deployment of femto cell and relay station deployments to ensure RF emissions are as low as possible.
- A mandatory requirement for successful bidders to plan for high capacity from the outset of IMT-A network rollout with a view to supporting wholesale competitor access.

Summary.

Clear Mobitel is pleased to provide the TRAI its views in the responses to the questions posed in its consultation. The issues raised in the consultation are very important, particularly those that relate to the regulatory conditions that should prevail upon a future auction of spectrum for IMT-A networks. Clear Mobitel asserts that 2 central tenets should be present in a future auction for IMT-A network spectrum:

- All mobile spectrum, current and future allocated must be used efficiently and licensed entities must be able to demonstrate as such to the TRAI.
- The TRAI should impose spectrum caps on all licensed entities in regard of the total volume of spectrum they are permitted to hold/acquire both sub-1GHz and in total prior to a future auction.

- Successful bidders of spectrum should have both coverage conditions included in licenses for such spectrum so as to ensure rural communities achieve coverage as well as towns and cities.
- So-called *'use it or lose it'* conditions should be included in licenses for such spectrum to prevent spectrum hoarding or anti-competitive exclusion of new entrants.
- The TRAI should look seriously at revenue sharing as a way of successful entities paying license fees for the use of the spectrum.

Any further conditions applied should be aimed at ensuring the TRAI encourages strong future competition in both pricing and services to the ultimate benefit of the Indian consumer.

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