

**TELKOM'S SUBMISSION ON THE DRAFT RADIO FREQUENCY SPECTRUM
FEE REGULATIONS AS PUBLISHED 16 MARCH 2009 IN GOVERNMENT
GAZETTE No 32029 (NOTICES 304 AND 305 OF 2009)**

1. INTRODUCTION

Telkom SA Limited ("**Telkom**") welcomes the opportunity to provide comments on the draft Radio Frequency Spectrum Fee Regulations as published 16 March 2009 in Government Gazette 32029 (Notices 304 and 305 of 2009).

Telkom's comments are focussed on the Draft Radio Frequency Spectrum Licence Fees Regulations ("**draft Regulations**")¹ although comments on the Draft Radio Frequency Spectrum Licence Fees Discussion Document ("**discussion document**")² are also given where necessary. Where appropriate and if required, Telkom will address ideas and concepts from the discussion document even if these were not included in the draft Regulations.

Telkom requests an opportunity to make an oral representation. Telkom requests a time slot of one (1) hour for presentation.

Telkom's comments consist of:

1. Executive summary
2. General comments
3. General comments on the draft discussion document and draft regulations

¹ Notice 305 of 2009, Government Gazette 32029

² Notice 304 of 2009, Government Gazette 32029

4. Specific comments on the draft discussion document and draft regulations

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2. EXECUTIVE SUMMARY

Telkom has indicated that, if implemented in their current form, the draft radio frequency spectrum fees regulations will result in substantial increases to the fee Telkom currently pays. It is consequently our view that Section 93(1) of the EC Act is applicable and that our Spectrum Licenses should be converted on no less favourable terms.

Telkom is proposing that the UNIT price of frequency be set at R75. This will satisfy our aforementioned concern. The Authority may wish to review the UNIT price and indeed the formulae used in future; however in the interim:

1. Operators should be given an opportunity to, where technically and financially feasible, reengineer their networks in an attempt to obtain greater efficiencies.
2. The Authority should be able to better calculate the total ECS & ECNS license fees and total frequency license fees receivable.
3. The Authority should provide direction to the operators on its strategy towards roll-out obligations attached to frequency spectrum licences.
4. The Authority should provide direction on which frequency bands are likely to be auctioned, the process to be followed, and the likely revenues associated therewith.
5. The Authority should introduce mechanisms that enhance the free market efficiency of frequency e.g. frequency trading & subletting.
6. The Authority should provide direction on the national frequency band plan, in particular with respect to spectrum re-farming.

Telkom is concerned that if implemented in their current form, the regulations effectively amount to the extraction of economic rents from operators. This is clearly not in the public interest. Telkom is of the firm

position that there is a clear case for zero rating frequency bands applicable to universal service obligations and/or rural areas. In addition there are examples such as VSAT, maritime radar etc. where there appears to be no objective rationale for the payment of any frequency fees which are inevitably passed onto the end consumer.

Telkom would like to reiterate that with respect to bands where demand exceeds supply (e.g. IMT) we are in favour of the spectrum being priced at a market value. However, we believe that these economic profits derived from industry should be counter-balanced by lower fees levied elsewhere. Hence Telkom is of the view that there is a just cause for zero rated frequency bands and a reduction in license fees payable by operators (especially instances where all three licenses are required to deliver a service).

Telkom is lastly concerned with the AIP method itself. Although there is merit in theory, we are concerned that in practice the formula may effectively amount to taxation as operators are limited in the degree to which they can actually change usage patterns, especially in the context of license obligations. Moreover we are concerned that the formula, whereby operators pay according to area covered, does not promote the public benefits of universal service, however instead rewards "cherry-picking" behaviour. Telkom is of the view that the method which best incentivizes national roll-out is a flat rate fee approach, of which there are several approaches that could be used to derive the relevant rates.

The Authority has published draft frequency license fee regulations that intentionally exclude the broadcasters with no just cause shown. The regulations purport to introduce an AIP scheme that should lead to a more efficient market; however, by excluding broadcasters (who are reportedly the most inefficient operators) they undermine the stated objective of the

entire regulation. The Authority was created as a converged Regulatory under the ICASA Act for exactly the purpose of co-regulating broadcasting and telecommunications with respect to frequency; however in not doing so the Authority appears to have eschewed its responsibilities under law. These regulations must hence be suspended until the applicability is extended to also include broadcasters.

Lastly, the Authority should take note that the radio frequency spectrum should be seen as an enabler to the roll-out of networks in support of universal service as per the objectives of the EC Act. There is a trade-off between charging for spectrum to promote efficient use as opposed to creating barriers for market entry, which in turn would lead to under-used spectrum resource. These regulations if implemented would tend to drive behaviours that minimize spectrum usages, as promoting behaviours that maximize spectrum usage. The former is clearly not in the public interest while the latter is.

3. GENERAL COMMENTS

3.1 Key Regulatory matters

3.1.1 Continued application of the 'no less favourable terms' provision

On 18 July 2008 Telkom received an email from the Authority attaching a number of draft radio frequency spectrum licences in the name of Telkom SA Ltd, with a request that Telkom submits comments by 4 August 2008. In responding to this request Telkom also made it known to the Authority that the request for comments was viewed as an initial step of gathering information on the format the converted radio frequency spectrum licence will take under the licence conversion process.

Further in its comments at paragraph 3.5 of its submission Telkom reaffirmed its reliance on section 93(1) of the Electronic Communications Act ("EC Act"), which provides that existing licences must be converted on no less favourable terms. "*Existing licences*" in the EC Act is defined as '*licences granted to persons prior to the coming into force of the EC Act in accordance with the provisions of the Telecommunications Act, the IBA or the Broadcasting Act*'. All of Telkom's radio frequency licences, except for two, were granted in terms of the Telecommunications Act. The licence conversion process under section 93, and specifically section 93(4)(a)(ii) mandates the Authority in its framework in converting existing licences and issuing new licences, to issue a licence holder, whose existing licence authorised provision of service and operation of electronic communication facility or network, with a separate licence relating to any radio frequency spectrum authorised in the existing licence.

Accordingly, Telkom as the holder of existing radio frequency licences issued under the Telecommunications Act was entitled in the conversion

process to have its existing licence converted on no less favourable terms. The draft radio frequency spectrum fee Regulations and the formulae provided therein will result in an overall increase of approximately 2600% (using Telkom's understanding of the proposed formulae) in the spectrum fees being paid by Telkom. This would be in violation of the no less favourable terms provision, which provision Telkom argues it is still able to rely on.

Telkom's argument is that acceptance of the converted ECS and ECNS licences cannot be viewed as Telkom losing its right to rely on s93(1). This argument is especially strong *vis a vis* the draft radio frequency spectrum licences in that:

- The process of converting spectrum licence had been at its infancy and Telkom and operators were expecting further engagement in this regard;
- By the stipulated period for when conversion should have been finalised Telkom (and other operators) had not been furnished with converted spectrum licences as intended by s93(4)(a)(ii);
- The conversion process, as it related to radio frequency spectrum licences, was never finalised.
- These draft regulations, in addressing spectrum fees which are an integral part of the current spectrum licences, are a continuation of the licence conversion process

Telkom's insistence that the Authority follows the process outlined in section 93 of the EC Act stems from the recognition that the section 93 process, especially section 93(1) was intended by the drafters of the legislation to act as a protection of the rights and interest of operators during the conversion process, thereby ensuring that the licence conversion does not place holders of lawful rights in a worse position that they were pre-conversion.

The failure by the Authority to give effect to s93(1) by issuing operators with converted spectrum licences so that operators move from a position post conversion of being assured that all their rights are protected is a violation of an important pillar of the conversion process.

Again Telkom has to re-iterate, as it had done so in its response to the Licence Fees Regulations that Telkom is not intimating that radio frequency spectrum licence can never be amended, as section 31(4) does provided for specific instances when Radio Frequency spectrum licences may be amended.

Telkom welcomes an approach that in the long run may bring greater efficiencies to the industry; however rights enshrined in the EC Act have to be upheld.

3.1.2 Harmonization of Radio Frequency Spectrum Pricing and its negative consequences

In its discussion document, as well as, draft Regulations the Authority outlines the reasons abandoning the current asymmetrical approach to spectrum fees. While Telkom understands the tendency to harmonise, Telkom also believes that it is imperative that the Authority, in embarking on this approach, has regard to the previous and existing policies and / or regulatory and legislative framework that informed some of the decisions made by the Authority in awarding of spectrum. These existing policies and / or regulatory and legislative framework forced Telkom to utilise certain spectrum in a certain manner.

An apt illustration of this point is the 38 GHz band, which the Authority for years refused Telkom access to, because ICASA had plans with respect to its utilization. This refusal forced Telkom to utilise other spectrum (notably

the 23 GHz band), which, although would amount to ineffective use of spectrum, was the only spectrum suitable outside of 38 GHz.

3.1.3 Draft Regulations to provide clear guidance

Telkom notes that in some instances much of the substance that provides clarity on the intention and implementation of the draft Regulations is contained in the Discussion document, and that in the absence of the Discussion document the intention and the implementation process is not as clear. Regulations are by their very nature tools that guide implementation. Telkom is sure that the Authority is aware of the dangers associated with having Regulations which are not sufficiently clear or rely on external documents for clarity. One of such dangers is conflicting interpretation, which delays implementation or worse still often result in litigation. Telkom has indicated in some areas (see for example section 4.8.6 where this is present, but recommends that the Authority relooks this matter before concluding the final regulation.

3.1.4 Telkom's philosophy towards spectrum fees

The Authority has recently published License Fees Regulations in Government Gazette No. 31993 of 6 March 2009. Telkom will in the following pages comment on the merits the draft regulations. However, Telkom is of the view that the draft Regulations can not be viewed in isolation and that the Authority should take a holistic view on this matter.

Firstly, the draft regulations make an implicit assumption that frequency allocation operates on pseudo free market principles. The assumption is that licensees will be prepared to pay more for the frequency if they can find a more profitable use and, in this way, the usage of frequency will be maximized from an economic efficiency perspective. Telkom will argue in due course that this hypothesis itself is debatable; however, in particular in

the South African context frequency does not follow “free market principle” in that:

- The EC Act currently forbids operators to trade (i.e. specifically sell) frequency. Although this is no doubt meant to disincentive operators obtaining frequencies which they do not intend to use, but rather exploit for economic rents, the fact remains that such a limitation undermines a free market.
- There are no regulations which espouse the Authority’s intended approach towards spectrum re-farming in South Africa. This is a critical tool in achieving efficient spectrum use, and is definitely more effective than inactive pricing schemes.
- There are no regulations which govern the subletting (full or partial) of frequencies to other operators. Such practices lead to a more efficient spectrum market.

Secondly these draft regulations must be viewed holistically in conjunction with

- License Fee Regulations
- Spectrum Roll-out Obligations
- Subscriber Service Charters, etc.

With regards to the former, Telkom notes that the License Fee Regulations³ (justifiably or otherwise) draw a parallel between the running costs of the Authority, and the fees received from all operators. Without prejudice to Telkom’s arguments made with respect to the aforementioned regulation, lets us accept this proposal as the basis upon which all fees received from the industry are based. This having being said, Telkom would like to point out:

³ Notice 239 of 2009 published in Government Gazette No. 31993 of 6 March 2009

- These frequency licence fees should likewise be based on the running costs of ICASA.
- Secondly, to the extent that the Licence Fee regulations consider the total revenues received by ICASA, those Licence Fee regulations must take account of any increase in frequency fees received. Given that the draft frequency fee regulations will increase the total fees payable, it implies that the revenue forecasts of ICASA will require review.
- Thirdly, given the table below (Table 3 from Notice 239 of 2009) already indicates that the Authority's revenues exceed the Authority's budget; there is no rationale upon which frequency fees can be increased.

Table 3: Year-on-year revenue collection versus the regulatory budget (R millions)

	Financial Year							
	2003/4	2004/5	2005/6	2006/7	2007/8	2009/10	2010/11	2011/12
Total revenue	822.6	988.9	1066.2	1346.6	1656.9			
Year on year growth		20%	8%	26%	23%			
ICASA's budget		219.6	178.4	180.7	256.3	269.6	300.9	328.4
year on year growth			-19%	1%	42%	5%	12%	9%
Total revenue less budget		769.3	887.9	1165.9	1400.6			
% over-collection		350%	498%	645%	547%			

Thus, what Telkom is stating is that either the licence fees payable by operators must decrease or the frequency fees payable by operators must decrease. To the extent that there is currently an over collection, Telkom is of the view that there is more than sufficient scope for both to decrease. The simplest method to decrease the frequency fees would be to reduce the UNIT price of frequency.

3.1.5 Universal service obligation

The frequency fee regulations are made without operators having sight of any roll-out / universal service obligations that may in future be attached to frequency bands. In Telkom's case, there are actually currently frequency bands (e.g. DECT) which are associated with Telkom's current universal service obligations. The operators thus do not have sight of the full cost of the various frequency bands, and thus no operator is in a fully informed position to respond to these regulations. The introduction of any future regulations is not likely to alter any of Telkom's principal responses made with respect to this submission; however, on a matter of specifics, the table of FREQ values which correlates the value of frequency to a price factor can only be commented on properly when one is able to assess the total cost of a frequency band.

Telkom is of the view that it is the Authority's duty, acting in the public interest, to ensure that the obligations and total costs borne by operators are just and fair and will promote investment in network infrastructure. Any costs beyond that which is minimally necessary may in part be carried by operators, however is more likely to be passed onto consumers. It is with reference to this principle that Telkom urges the Authority to consider frequency fees, license fees and frequency roll-out obligations in total.

Telkom supports the principle that commercial frequencies be charged at market rates if the necessary free market mechanisms are in place, since this approach may lead to optimal frequency allocation. However, given that market orientated rates imply that something is priced above its cost, Telkom believes that the "profit" derived from frequency fees must be compensated for by lower (potentially "loss"-making) fees elsewhere e.g. license fees. However Telkom is equally concerned that there are frequency bands affected by these regulations whereby the net result is simply the

extraction of economic rents by the Authority. Telkom can not see how this in any way can be in the public interest and urge the Authority to accept that it is in the public interest if the fees on non commercial bands were placed at the lowest level fee possible.

3.1.6 General views on spectrum pricing

It is often claimed that spectrum is a scarce resource and it appears that the draft regulations are based, to a degree, on this hypothesis. There is a counter argument that states that spectrum is not in fact naturally scarce, however, if poorly managed it becomes scarce and hence scarcity is an artificially produced phenomenon. If one is of the first school of thought then one's natural inclination is to minimise spectrum usage – and that would be one's understanding of efficiency. If, instead, one is of the second school of thought, one concludes that in order to maximise public benefit one must maximise spectrum use. For any resource, the primary objective should be to maximise the net benefits to society that can be generated from that resource, also referred to by economists as economically efficient distribution of the resource. A resource is considered efficiently distributed when the overall benefit to society is maximised when it is impossible to redistribute so as to make at least one individual better off without making another worse off. This is known as the "Pareto Optimal Criterion".⁴

The draft regulations propose a formula that follows a "pay as you build" methodology. Although such a principle may be fair, it does not maximise the social benefit of a public resource. Instead, a spectrum allocation method that is based on a fixed fee (determined by administrators or an auction) gives the incentive for one to rapidly increase one's network build since for every additional tower or base station erected, the unit cost

⁴ See Report ITU-R SM.2012-2

decreases. In its current form the draft regulations actually have the perverse effect of rewarding “cherry picking” behaviour. Operators of significant scale, such as Telkom, who are to an extent obliged to provide a variety of services, are clearly disadvantaged relative to smaller or new entrant operators who have the luxury of electing where they will and will not compete.

Furthermore, whereas under a fixed fee regime the cost is generally distributed across the business, a “pay as you build” formula provides a direct correlation between a particular link or tower and costs. Under this method, operators can in most instances determine per customer or per site what the actual additional cost will be and, as per earlier arguments, are incentivised to directly pass this cost onto the consumer. Notwithstanding the thought which has gone into constructing the particular formula, Telkom is of the view that a fixed fee would most likely achieve the objectives of the Act in accelerating the deployment of wireless broadband infrastructure. Such a fixed fee should also be set at an appropriate level to support efficient spectrum use without unduly increasing the input cost associated with spectrum.

a) Administrative Incentive Pricing (AIP)

Telkom acknowledges that the use of AIP as a spectrum management tool has theoretical merit; however, one must realise that AIP is based upon a set of assumptions that may not hold in all instances. The assumption behind AIP is that spectrum applicants or holder are able to modify their behaviour. The reality is that in the majority of cases spectrum holders are not able, due to licence obligations, technical factors (e.g. ITU-R spectrum allocations, deployed CPE base), or other factors beyond their control, modify their behaviour in a manner that leads to greater public benefit – as many examples hereafter will attest to. Hence Telkom cautions that the application of this methodology should be evaluated carefully within the

context of local conditions and criteria in order to avoid setting prices to the point that it becomes a barrier to economic development and network roll-out. A simple example of this is setting a single value of UNIT price, at an arbitrary level, resulting in excessive spectrum prices in some frequency bands and very low spectrum prices in other frequency bands, which do not necessarily relate to the economic value of the radio frequency spectrum.

The Authority recognises in their discussion document that: "...spectrum fees should not be a barrier to economic development, innovation, historically disadvantage groups and the dispersal of economic activity over the whole country."⁵ There is however no evidence from either the discussion document or the draft regulations suggesting that the Authority has performed an economic impact assessment to determine the overall effect that the proposed spectrum fees will have on the overall economic development in South Africa. Telkom actually contends that the regulations in their current form do not provide net public benefit.

b) International benchmarking

It is noted that the Authority did compare spectrum fees paid in South Africa versus those paid in other countries⁶. Telkom must caution the Authority against international benchmarking for a number of reasons:

- The purchasing power of the average South African user is far inferior to those in first world countries;
- The demographics and telecommunications legacy of South Africa implies the frequency spectrum takes on a much more fundamental role in the South Africa economy than in other jurisdictions.

⁵ Discussion Document, Section 2, last paragraph

⁶ Discussion document, Section 1, second bullet

In the discussion document⁷ it is stated that “*the prices, especially minimum prices*”, are much lower than those levied in Kenya. It is not clear why this is even a consideration or used as a benchmark when considering that the purpose is either to recover the Authority’s administrative costs in managing the spectrum, especially regarding the minimum fee, or the objective is AIP. Telkom is also surprised that the Authority has chosen a single country to use as support or justification for its proposal. In any case, the spectrum prices levied in Kenya (or any other country) is not relevant.

3.1.7 Pro rata implementation

Where it seems that pro rata invoicing will apply to the minimum fees, the draft regulations are silent regarding this matter for spectrum fee calculations. Telkom recommends that this principle should continue to apply as is currently the case.

3.2 General concerns with the formulae proposed

At first glance the proposed formulae appear well thought out and rational; however concerns abound.

- A good formula makes use of independent variables. Instead, we find that the current formulae have many variables that are highly correlated. In particular, FREQ (frequency), CG (congestion) and SHR (sharing) are, to various degrees, functions of demand for a frequency band; whereas SHR and ASTER (area sterilised) also correlate in that the only operators who realistically share frequencies are those who operate in the spectrum licence exempted bands, for example in some ISM frequency bands. In particular, many users do not sterilize large areas – in contrast to a broadcaster who sterilizes a large area and

⁷ Discussion document, Section 7.1, last paragraph

will never share frequencies. These correlated factors will result in double taxation and should be eliminated.

- It is universally understood that there is a “sweet-spot” in the radio frequency spectrum (i.e. approximately 700 MHz – 3.5 GHz) and thereafter frequencies become progressively less sought after. Telkom is particularly concerned that the current formulae, in its mechanistic form, tend to under price the sweet-spot bands and over-price other bands. One could respond by adjusting the FREQ table, however, the question remains – when does one know if you have the right values? The answer is perhaps when the market price for a particular frequency equals the formalistically determined price for a frequency; however this leads to the question of “what is the incentive factor”. Essentially this all goes to show that a formalistic approach to pricing frequency is prone not only to controversy but also to errors. Telkom seriously questions whether the currently proposed formulae are fair under all frequency uses; however, it appears a difficult task to propose a substitute which would be. Hence Telkom’s preference for fixed spectrum fees.

4. Specific comments on draft regulations

4.1 DRAFT RADIO FREQUENCY SPECTRUM LICENCE FEES REGULATION (introduction paragraph)

DRAFT RADIO FREQUENCY SPECTRUM LICENCE FEES REGULATION

This draft regulation will replace Regulations E1 (Licence and Examination fees) of the Radio Regulations.

According to section 16 of the draft regulation (“*Repeal and Amendment*”) the intention is to repeal Regulation E1 of Chapter 6 of the Radio Regulations (“**Radio regulations**”) published in Government Gazette No. 2862 of 28 December 1979. Chapter 6 of the Radio Regulations consists of three sections, namely, E1 (“*Licence Fees*”), E2 (“*Examination and certificate fees*”) and E3 (“*Application fees*”). In accordance with the draft discussion document⁸, it is clear that the intention is to replace only Regulation E1 but to keep Regulations E2 and E3 unchanged.

The introduction paragraph (copied above) however indicates that Regulations E1 (Licence and Examination fees) (own emphasis) will be replaced. The reference to Examination fees is therefore incorrect and should be deleted.

4.2 Purpose of these regulations (section 2)

Telkom submits that it is very difficult to understand the purpose of these regulations through reading of Section 2 of the draft regulations and therefore recommends that it be revised. Although not clear, it would seem that there is an argument to be made that standardising Radio Frequency Spectrum Fees and Pricing would promote efficiency of spectrum use. Telkom will argue that the standardisation of spectrum fees and pricing per

⁸ Discussion document, section 1 (Introduction), 1st and 2nd paragraphs

se has no effect on the efficiency of spectrum use. The argument could however be made that the level of the fee, and the way it is implemented, could potentially promote efficiency of spectrum use. Standardisation of fees is nevertheless supported in order to promote transparency and fairness.

Also, the reference to “*conformity with international standards in the usage of spectrum*” is unclear within the context of national spectrum pricing and needs further clarification.

4.3 The objective of these regulations (section 3)

Telkom wishes to raise the following issues regarding the Authority’s objectives for the proposed spectrum pricing regulations:

4.3.1 Section 3(1) (Objective 1)

Telkom fully supports the objective of transparent, fair, competitive and non-discriminatory spectrum pricing based on Administrative Incentive Pricing (AIP).

Section 3(1) of the draft regulations states that “*auctions and other internationally accepted methods of determining Radio Frequency Spectrum Price*” are not excluded. No further information regarding auctions and “other” methods to determine spectrum pricing are provided in the draft regulations and it is therefore not clear in what context and when these will apply or be considered. Save to say that this should be done through another regulations drafting process.

4.3.2 Section 3(2) (Objective 2)

According to objective 2 these regulations will encourage effective and efficient use of spectrum and, through incentives, encourage migration to lesser populated and lower-demand frequency bands.

Telkom supports the efficient and effective use of the radio frequency spectrum. Telkom would however caution the Authority not to hold efficiency to be the only guiding principle when considering spectrum pricing since there are many other EC Act policy objectives that are all equally important and relevant in this process.

Every spectrum usage implies an end user or network termination device. In many cases the costs of replacing these devices in the event that particular radio equipment has to be migrated to another frequency band is significant. ICASA is thus obliged to consider consumer welfare and the economic cost potentially incurred by operators in addition to the goal of efficient spectrum use.

Whereas these regulations will promote more effective and efficient use of the spectrum in some cases and in the long run, Telkom is concerned that the proposed pricing structure will go beyond this objective and in effect result in discouraging the use of radio frequency spectrum because of the increase in input cost, even in cases where there is no shortage of spectrum. The "Worked Example", provided in section 7.5.3 of the discussion document, is a point in case where the input cost for a radio link in a rural area is increased by almost R1000 per month. Considering that there is probably no spectrum shortage in the area, the rationale for this sizable fee is debatable in the context of administrative incentive pricing. Apart from the frequency band, which could be optimised for the required radio link distance, there is no further action that can be taken on the part of

the operator to further improve the spectrum price. This price can therefore be seen as spectrum rent or tax. It is important that the Authority considers the impact of this additional input cost on service delivery.

Telkom believes that spectrum usage is of paramount importance, as opposed to the spectrum itself. One cannot pretend that users of spectrum simply can or will migrate to alternative bands “because it would be more efficient if they did”. Telkom will also argue that the proposed draft regulations will not necessarily promote migration to other frequency bands for the following reasons:

- a. Migration of existing PTP radio equipment to another frequency band is a very costly exercise and incentives must be sufficient to warrant this migration. In the case of PTP radios, the only potential saving would be to move to a sufficiently higher frequency band to enable a lower FREQ factor. This will not necessarily be possible since it will depend on the availability of suitable radio equipment in the higher frequency band. Also, due to the broad frequency ranges specified, a move to a higher frequency band could fall within the same range or the HOPMINI factor could offset the potential saving. To make up for the higher frequency band a lower modulation level will probably have to be used, which could increase the amount of required bandwidth and thereby increasing again the spectrum fee. The net gain is therefore debatable.
- b. With regard to point-to-area systems, it is very unlikely that the proposed spectrum fee structure will motivate the migration to higher frequency bands. Although this may apply in certain exceptional circumstances, there are many factors that will prevent a natural migration to higher or other frequency bands including, amongst others, equipment availability, propagation conditions, international harmonised standards, roaming, intended services and the availability of key international harmonised frequency bands for

access services. These factors will determine what can be used and not the motivation to use lesser populated and low-demand frequency bands. Again the frequency ranges are also very broad meaning that a move to a higher frequency band will in any case not necessarily result in a saving in spectrum price (take for example that the entire “sweet spot” access frequency band of 700 MHz to 3.5 GHz falls between a FREQ factor of 0.4 and 0.3).

- c. Overall, it is also arguable if there should be a need for forced migration since in almost all cases, with the exception of a few key mobile frequency bands, the demand for spectrum does not exceed the supply. What the spectrum fee structure will probably achieve (in the case of PTP links) is a general long-term move to use higher frequency bands, provided that such higher frequency bands are available (it took Telkom more than 8 years to obtain access to the 38 GHz frequency band in order to optimise on the minimum hop length).

4.3.3 Section 3(3) (Objective 3)

For more detail on administrative cost recover please refer to section 3.1.4 .

4.3.4 Section 3(5) (Objective 5)

These regulations will probably have the exact opposite effect to the objective of even development of telecommunications infrastructure across South Africa. The fact that the input cost for the deployment of radiocommunication infrastructure is increased substantially and in some cases unnecessarily, especially in the case of PTP radios in the rural areas where there is an abundance of spectrum in most frequency bands means that the general costs for providing communications services are increased. Telkom’s overall spectrum invoice could increase by between 385% and 2600%, or in absolute terms between R150 million and more than R1 billion

annually, which will have an impact on the cost of communication services in South Africa.

It is also argued that the proposed spectrum fee structure does not provide enough incentives for the deployment of radiocommunications, especially in the rural areas. It is therefore not clear how the proposed draft spectrum fees will support the development of even telecommunications infrastructure across South Africa. It is also important to keep radio communications competitive with cable and fibre to ensure diversity in transmission medium is available. High spectrum fees would also impact on roll-out of future networks and network investments, and ultimately will have a negative impact on consumers in rural areas. Radio frequency spectrum should be seen as an 'enabler' for network roll-out and service delivery and not as a barrier-to-entry, as will be the result of the proposed increase in spectrum fees.

4.4 Fee Determination (section 4)

According to section 4(a) of the draft regulation, the fees payable for "*each category*" of frequency spectrum is determined either through the application of one of the formulae or by adopting the minimum fee. It is not clear whether "*each category*" refers to only those categories listed in the table in section 11 of the draft regulation or to any category of frequency spectrum usage. Telkom recommends that this be clarified and made clear in order to avoid any possible doubt. See also Telkom's comments in section 4.11 below.

4.5 Exceptions (section 5)

4.5.1 Licence exempt use

Since equipment may also be exempted from an ECNS licence, Telkom recommends that sub-section 5(1) be amended to “...*equipment that is spectrum licence-exempt...*”

4.5.2 Auctions

Whereas this draft regulation contains no additional information regarding the application of auctions, Telkom understands that this will be prescribed through separate regulation.

4.5.3 Non-payment for use of broadcasting spectrum

Telkom is of the view that the mere fact that broadcasting is exempted from these regulations undermines the very principle of efficiency the regulations seek to uphold; as broadcasters not only hold a significant amount or prime spectrum but it is also generally considered to be inefficient in its use.

Whereas the pricing structure may be different for broadcasting services, in particular public broadcasting, Telkom cannot agree with the notion that broadcasters are totally exempted from paying any spectrum fees. Apart from the fact that no reasons are given why this decision was taken, it goes directly against the principles contained in the discussion document, the draft regulations and in the EC Act. These include, amongst others:

- It encourages spectrum hoarding since there is no incentive to release unused spectrum. To the contrary, it creates an incentive for broadcasters to acquire as much spectrum as possible for possible future yet to be defined services.

- It goes directly against objectives (1), (2) and (3) of the draft regulations in that it is not fair, it is discriminatory, does not promote efficient and effective utilisation of the spectrum and the cost of managing the broadcasting spectrum is not recovered.
- Broadcasting services involve a substantial amount of administrative costs to plan and manage a substantial amount of spectrum and it is not clear why some services should pay for these administrative costs while others are exempted. This may result in telecommunications operator's cross-subsidising the broadcasters in relation to the administrative costs of spectrum management.
- With the advent of service and technology convergence the distinction between broadcasting and communications is becoming more and more blurred. It is not clear when "broadcasting services" may in effect become communication services and this grey area may be exploited by the broadcasters to not pay spectrum fees while competing head-on with communications operators (e.g. DVB-H as "broadcasting" versus using a 3G technology to also broadcast content). To put this into context, a 2x10 MHz assignment in the UHF frequency band, based on the proposed formula for point-to-area coverage, will cost a communications operator R13.5 million (considering national coverage and band as congested). With the convergence of services broadcasting will morph into more than just unidirectional broadcasting.
- A zero rate will obviously not reflect the economic value of the spectrum. Using the Authority's own formula and, depending on the values for the factors chosen, the current UHF broadcasting spectrum (470 – 862 MHz) is calculated to be worth between R88 million and R264 million per annum.
- The methodology of the Authority's pricing system is based on the extent to which spectrum is denied to other users. Broadcasting spectrum, in particular UHF frequencies, could be used by other

services such as mobile, but broadcasters do not seem to be required to pay any fee for denying mobile operators the opportunity to more effectively use UHF frequencies.

4.6 Formulae (section 6)

Reference is made to the “price schedule” although there is no price schedule in the draft regulations and it is recommended that this be corrected. If it is assumed that the “price schedule” refers to the table contained in section 11 of the draft regulations (Table of Fees by Type of Radiofrequency Licence), Telkom’s comments made in section 4.11 refer.

4.6.1 Point-to-area formula

a. Impact on Telkom

The overall increase in spectrum fees for Telkom for using point-to-multipoint frequency bands when applying the proposed point-to-area formula are in excess of 340% or in absolute terms an increase of more than R96 million per annum. What is of concern for Telkom is that the prime frequency bands (e.g. 2100 MHz and 1800 MHz) are increased between 20 – 40% whereas some of the other access frequency bands, which are used to provide rural access communications are increased by up to 29,000% (for example 350 MHz band used only in rural areas).

This increase will have a negative impact on service delivery in particular in the rural areas and will definitely force operators to reconsider their business model using these frequency bands. Considering also that some of these frequency bands are not as “valuable” as some of the other key mobile frequency bands and that the spectrum price is an input cost that will apply to all operators using the particular frequency bands, it is debatable that the proposed pricing structure will improve effective use of these frequency bands since it will

be very difficult for operators to justify a business model applying these spectrum fees. Instead of obtaining effective and efficient use of the spectrum the proposed price structure may result in the spectrum not being used for additional network roll-out and therefore brings no economic benefit to especially those who need it most.

This is an indication that the formula, or some of the factors, is maybe distorted. The individual factors are addressed in section 4.8 below.

4.6.2 Point-to-point formula

a. Impact on Telkom

Regarding point-to-point systems, the proposed price formula will increase the price of frequency spectrum for Telkom by more than 400%. In absolute terms this is an increase of almost R43 million. The increase in some of the individual frequency bands is more than 7,200%. However, applying the point-to-point formula will mean that Telkom loses its exclusivity in these PTP frequency bands because the proposed point-to-point formula applies on a link-by-link basis. If Telkom should go the link-by-link assignment route it will have a tremendous impact on Telkom's ability to deliver services (see section (b.) below) and will therefore be less-favourable compared to our current spectrum licences. In order to retain exclusive use of the assigned PTP frequency bands, Telkom will have to apply the point-to-area formula to all Telkom's exclusive PTP block assignments. This will however increase the price for PTP frequency bands by 8700% or in absolute terms almost R930 million, which is again less-favourable. The only solution to overcome this is to set the UNIT price at R75.

b. Exclusive block assignments

The principle of having exclusive block assignments for PTP systems is important for Telkom to ensure speedy rollout of radio communication services. This is important considering the current extensive long delays in obtaining individual frequency assignments from the Authority. For example, the average waiting period for a 13 GHz PTP link assignment is more than 6 months and could be up to 12 months.

Considering the number of PTP assignments done by Telkom within its exclusive frequency bands on a daily basis, which are done on average in less than 2 working days each, Telkom has serious reservations about the Authority's ability to handle all these assignments, plus those of the entire industry, within a reasonable time period (in any case less than 5 working days).

Until the Authority has proven its capability of handling this workload within reasonable time periods and still guaranteeing that harmful interference will not be caused between operators, Telkom, and other operators, will have no option but to opt for exclusive block allocations in the majority of cases. Whereas the current point-to-area formula, when applied to the PTP frequency bands, does support exclusive block assignments, the price structure will make this very expensive, in particular for Telkom who is using a large amount of frequency bands in support of the PSTN. It is therefore also recommended that operators who use exclusive block allocations be incentivised since they are actually taking a huge administrative burden from the Authority. It is possible to add another factor to the formulae to reflect the case where operators perform spectrum management, spectrum monitoring and interference resolutions since this supports the Authority by reducing their administrative burden.

It should also be noted that, by implementing a policy of paying per link instead of a flat rate, Telkom will be impacted negatively and unfairly. Due to historic reasons during the previous dispensation, Telkom was obliged to provide services, even in areas where it was not economically viable. Implementing this per-link payment policy Telkom will be unduly penalised for fulfilling its obligations.

c. Concerns with formula

The purpose of the draft regulations is foremost to promote the effective and efficient use of the spectrum. However, there are spectrum management principles that are critical in this context, which are not built into the point-to-point formula. For example, there is no incentive for operators to reuse the same frequency at the same node or within the same area (unless the point-to-area formula is applied). In the case of the point-to-point bands, Telkom endeavours to reuse a frequency channel as many times as possible at any nodal station or within an area before using the next frequency channel, therefore optimising frequency utilisation to the maximum extend possible. The new formula however makes no difference between using one frequency or many frequencies at, for example, the same node. Also, there is not incentive for reusing the same frequency on a different polarisation or implementing spectrum utilisation improvement techniques such as XPIC (Cross polar Interference Cancellers).

In order to overcome these difficulties, Telkom recommends that the ASTER factor be reduced for PTP systems, in particular for national coverage. See also comments on ASTER value in section 4.8.6

4.6.3 Satellite Hub Ground Station formula

a. Concerns with formula

Telkom is surprised at the very simplistic formula for satellite hub ground stations when compared with the point-to-area and point-to-point formulae. It would seem that the principles of adopting incentives to support better use of the frequency spectrum for some reason do not apply to satellite services. For example,

- There is no FREQ factor: This implies that C-band and Ku-band satellite services are charged for equally and there is no incentive to move to higher and less congested frequency bands, for example to Ka-band when this become available. Also, within the context of recovering administrative costs, frequency coordination in Ku-band is far less time consuming compared with C-band coordination and this should therefore be reflected through the use of the FREQ factor. It should also be noted that Ku-band uplink (14 GHz) is used exclusively for satellite services and there is therefore no alternative use for this frequency band.
- There is no SHR factor: Satellite services generally share frequency bands with terrestrial services and other satellite users and therefore, because this incentive is given to the terrestrial services, it should also be applied to satellite services where applicable. See also comments made under section 4.8.5 regarding SHR.
- There is no GEO factor: It is not clear how a satellite earth station located, for example, in the middle of a city, where there is more demand for spectrum, will be charged the same compared to an earth station in a remote rural location. There must be an incentive to move satellite earth stations to less populated areas and the GEO factor should therefore also apply.

b. Teleports

Telkom strongly recommends that the Authority gives recognition to the deployment of satellite hub ground stations at Teleports (where more than one satellite earth station is collocated) due to the huge contribution it makes to the effective and efficient use of the radio frequency spectrum, in particular where these are placed in rural remote areas. Whereas individual earth stations “sterilise” many individual areas, antennae located at a Teleport “sterilise”, in general, only one area. In the context of Administrative Incentive Pricing, operators deploying satellite earth stations at a Teleport should therefore be incentivised by having to pay far less (maybe only for the first earth station deployed). Without this there is no incentive for operators to locate satellite earth stations at Teleports in rural areas considering the additional requirements in terms of backhaul, operational issues, etc. A discount system could apply for additional earth stations deployed in the same frequency band at a Teleport.

c. Point-to-point satellite systems

It is not clear what formula should be applied for point-to-point satellite links since these are neither a “hub” station nor a “VSAT subordinate ground station”. This category should therefore be addressed. It is recommended that the VSAT formula also apply for stand-alone point-to-point satellite earth stations unless when located at a Teleport where a suitable teleport discount should apply, as indicated above.

d. Specifying bandwidth

Bandwidth is defined as “MHz paired”. Although satellite services are generally asymmetrical it is assumed that “bandwidth (BW) in MHz” refers only to the uplink BW in MHz considering that satellite spectrum fees are payable only for uplinks. This also applies for VSATs.

e. Impact to Telkom

Although it was not possible to fully complete this quantification, it is estimated that the spectrum pricing impact to Telkom for hub stations will be in excess of R1.8 million per year.

4.6.4 Satellite VSAT subordinate ground station formula**a. Concerns with formula**

In Telkom's opinion, the proposed VSAT fee formula does not provide any incentive to optimise the use of the radio frequency spectrum used by VSATs but is rather a pure additional tax placed on these already costly services. The proposed formula only penalises the use of satellite services by further increasing its input costs, which are already very high because of the high cost of equipment, installation charges and transponder leases (paid to satellite operators). As also indicated for HUB stations, factors such as FREQ, GEO and SHR should therefore be added to the VSAT formula, as a minimum.

Since VSATs are deployed for a specific reason and/or application, it is not even possible to argue that an alternative technology or higher frequency band should be used. Also, because of the high cost of international satellite bandwidth, which is paid for in USD to the satellite operators such as Intelsat, satellite spectrum use is already optimised as much as possible. Spectrum pricing will therefore not improve the use of satellite spectrum but will only be an additional input cost that will have to be recovered from the customer.

b. Impact for Telkom

The total spectrum fee increase for Telkom's VSAT systems is almost R10 million per annum (excluding hub spectrum cost). Since Telkom is currently paying a flat rate for the use of VSAT spectrum, these costs

have never been passed onto any specific customer. The fact that the formula is applied to every VSAT terminal, allows Telkom to transfer this cost directly to the customer. Telkom is however concerned regarding the potential impact this may have on the VSAT market in South Africa.

As another example, Telkom's internal Skytrain videoconferencing system will accrue an annual spectrum fee of almost R1.5 million rand. This becomes another tax since it cannot be transferred to any customer since it is used for internal purposes only. By levying this fee on these systems will not have improve the efficient or effective use of the spectrum since it is already optimised and operating in the highest possible satellite frequency band. It will however definitely force operators to reconsider the viability of using this service.

c. Size of VSAT network

Telkom recommends that the size of the VSAT network be taken into consideration and that a "discount" be implemented in the formula for high volumes of VSATs since these terminals are all using the same frequency or frequencies albeit on different locations. As an example, the VSAT factor could be as follows:

Number of VSATs (per network)	Factor
Less than 500 VSATs	1
Between 500 – 1000 VSATs	0.5
Above 1000 VSATs	0.25

d. Calculating VSAT spectrum bandwidth

The calculation of VSAT spectrum usage is not simplistic due to the shared use of the spectrum. Most VSAT networks operate on a TDMA methodology where more than one inroute (VSAT transmit uplink carrier) is shared between a group of VSAT terminals, although each

VSAT will transmit on only one carrier at any time. As an example, a national banking group in South Africa has almost 2000 VSATs and these terminals all share 5 inroutes (carriers) each with 720 kHz bandwidth. The method to calculate BW is not clear in this case. Whereas any VSAT terminal transmits on only one carrier at any particular time, any of the 5 allocated inroutes may be used.

The problem is not really regarding the calculation methodology but is rather an economic concern due to the impact this decision will have on the amount of spectrum fees payable. If the total inroute bandwidth is used, and the fee applies to each and every VSAT terminal, the spectrum price per terminal becomes 5 fold (in the above example).

Considering the above, and to ensure that South Africa can continue to provide viable satellite services in South Africa, Telkom recommends that no VSAT spectrum fees should be charged. In case spectrum fees for satellite services are seen as a rent, the price should be reduced substantially by at least introducing the factors GEO, FREQ and SHR in the formula. Depending on the actions taken by the Authority as suggested above the UNIT value should also be set at R75.

4.7 Unit price (UNIT) (section 7)

The unit price of R2000 appears arbitrarily set as there is no analysis that shows how it was determined. This is of great concern to Telkom considering the tremendous impact that this one single factor has on the overall spectrum price. An understanding of the considerations that were taken into account in arriving at this figure, which if retained would have an adverse effect on Telkom's rights in existing radio frequency licences, would assure Telkom that the administrative justice requirements of reasonableness has been adhered to, and, relevant considerations have been taken into account in arriving at the figure.

In considering the very similar formula used by OFCOM for calculating spectrum pricing for fixed links, it is noted that an extensive calculation was done to determine the factor “Spectrum Price”, which is OFCOM’s equivalence to the “UNIT” factor in the draft regulations. The value of “Spectrum Price” was determined over many years through various extensive studies and analyses done by Smith-Nera⁹, Indepen¹⁰ and OFCOM¹¹. Various factors including, amongst others, link data rates and bandwidth possibilities, number and types of links already in use, equipment costs and least cost alternative solutions have been used to find the value for this factor.

It is even more concerning that the UNIT fee is applied across all services such as fixed, mobile and satellite making it even more unclear how UNIT was calculated. It is therefore essential that the rationale behind the R2000 unit price be elucidated. Since this information was not made available, nor was any reference made to any studies done in this regard, Telkom must assume at this stage that zero studies were done in support of the UNIT factor and that this value was set arbitrarily. It is noted in the discussion document that the Authority “...proposes that the UNIT price...be set at R2000,,,”, which could indicate that this is indeed an arbitrarily set value and open for discussion.

It therefore also elicits the question whether the Authority performed any market impact assessments to consider the overall market impact of the new spectrum prices. For example, the “*Worked Example*” in section 7.5.3 of the discussion document calculates the annual fee for a PTP link in a low density area (which

⁹ Study into the Use of Spectrum Pricing, Nera and Smith Systems Engineering, Radiocommunications Agency, April 1996

¹⁰ An Economic Study to Review Spectrum Pricing, Indepen, Aegis Systems and Warwick Business School, February 2004

¹¹ Spectrum Pricing, A consultation on proposals for setting wireless telegraphy act licence fees

also includes rural areas) at R11,877 or roughly R1000/month. This fee will double to R2000/month if deployed in a high density area.

Did the Authority assess the economic impact that this additional input cost or “tax” will have on communication service delivery in South Africa, especially when considering that these additional charges will probably be transferred directly to the end user? What impact will this cost have on network build and rollout, in particular in those areas where there is a marginal business case? In the above example a R2000 monthly spectrum charge could constitute a substantial proportion of the total monthly recurring service charges, which could render certain services too expensive and become unaffordable for consumers. Considering the critical role of radiocommunications in South Africa, spectrum pricing above what is absolutely necessary could result in a broadening of the digital divide. The Authority should also consider that in some cases Telkom is forced to adopt wireless solutions due to the impact of copper theft in South Africa. Operators are therefore forced to go wireless and should not be further taxed through the application of unreasonable spectrum fees.

Although it is acknowledged that the Authority must ensure efficient use of the radio frequency spectrum (section 2(e) of the Act) it is important to also consider the other objectives of the EC Act, notably sections 2(m) and 2(n) regarding price of communication services in South Africa. It is therefore only reasonable to expect that the Authority performs a market impact assessment to determine the potential impact (holistically and individually) that new regulations will have on the communication sector. Also, when implementing new regulations it cannot be done by considering only one objective of the Act – all objectives should be considered holistically.

Considering that there is little congestion in the PTP frequency bands, in particular those bands above 23 GHz (some frequency bands are even unused at this stage), the rationale for substantial spectrum price increases applicable in

these bands are not clear. It could be seen as contrary to sections 2(m) and 2(n) of the EC Act since these unnecessary additional costs will have to be passed on to the end user and will therefore drive the cost of communications in South Africa upwards.

Furthermore, following Telkom's proposal of spectrum fees across all operators set at the minimum level necessary, and taking into account any future revenues arising from frequency auctions, the Authority should (assuming the proposed formulae is being used) make an estimation of the likely results of the fee formula across all frequencies and then solve the unit price.

Based on our interpretation and assessment of the formulae, and in order to ensure that Telkom's rights are protected, we recommend that the UNIT value be set at R75.

4.8 Factors and Look Up Tables (section 8)

4.8.1 Bandwidth (BW) (sub-section 8(a))

Telkom agrees that bandwidth is specified as MHz paired since most assignments are FDD (Frequency Division Duplex) in nature with equal bandwidth on both legs. When considering TDD assignments it will therefore still be expressed as MHz paired, in line with current practice (e.g. 20 MHz TDD assignment will be expressed as 2 x 10 MHz paired).

Whereas Telkom could support the use of the "linear approach" when expressing bandwidth, it must however be accepted that bandwidth cannot be compared linearly in different frequency bands. For example, a 28 MHz channel in the 38 GHz band is not the same as 28 MHz in the 2 GHz frequency range due to the amount of spectrum available in the 38 GHz band (total bandwidth of 2500 MHz) compared to the 2 GHz band (total bandwidth of only 175 MHz). In order to directly compare bandwidth it

should be “weighted” such that a 1 MHz bandwidth at 100 MHz has equal weighting than 10 MHz bandwidth at 1 GHz, which again has equal weighting to 100 MHz at 10 GHz (where frequency band increase with factor of 10 the bandwidth also increase with a factor of 10). Nevertheless, where the linear approach could be accepted for BW the weighting must however be factored into the formula through the use of other factors such as FREQ. Considering the current values of the FREQ factor it is noted that there is a factor of 2 between 100 MHz to 1000 MHz and a factor of 2.5 between 1 GHz and 10 GHz.

4.8.2 Frequency factor (FREQ) (sub-section 8(b))

a. Editorial change in table

It is assumed that the Table indicated in sub-section 8(b)(i) is incorrect since it deals not with the FREQ factor but with the ASTER factor, which is addressed in sub-section 8(f)(i). It is further assumed therefore that the FREQ table on page 14 of the discussion document (section 7.2.2) is the correct table and was intended to be included in sub-section 8(b)(i). This must be corrected.

b. Frequency ranges used

Since this table will apply only to PTP systems, Telkom recommends that the frequency ranges be specified in such a way that standard ITU defined PTP frequency bands are not split between two factors. For example, the 23 GHz band occupies the frequency range from 21.2 GHz to 23.6 GHz. The current frequency ranges will therefore result in some of the 23 GHz links applying a FREQ factor of 0.15 (<23 GHz) whereas other 23 GHz links will apply a FREQ factor of 0.1 (>23 GHz). This could even mean that a specific frequency channel could be split in two, which will make the calculation of spectrum fees very uncertain. It will also mean that some operators will pay more for their 23 GHz spectrum than

others. It is also important to specify specific values to avoid ambiguity (e.g. 1.8 GHz is not clear enough).

Telkom therefore recommends that the table be amended as indicated below (two changes are recommended in terms of 1.8 GHz and 23 GHz bands). Also refers to Telkom's proposals regarding the values of the FREQ factor in the next section.

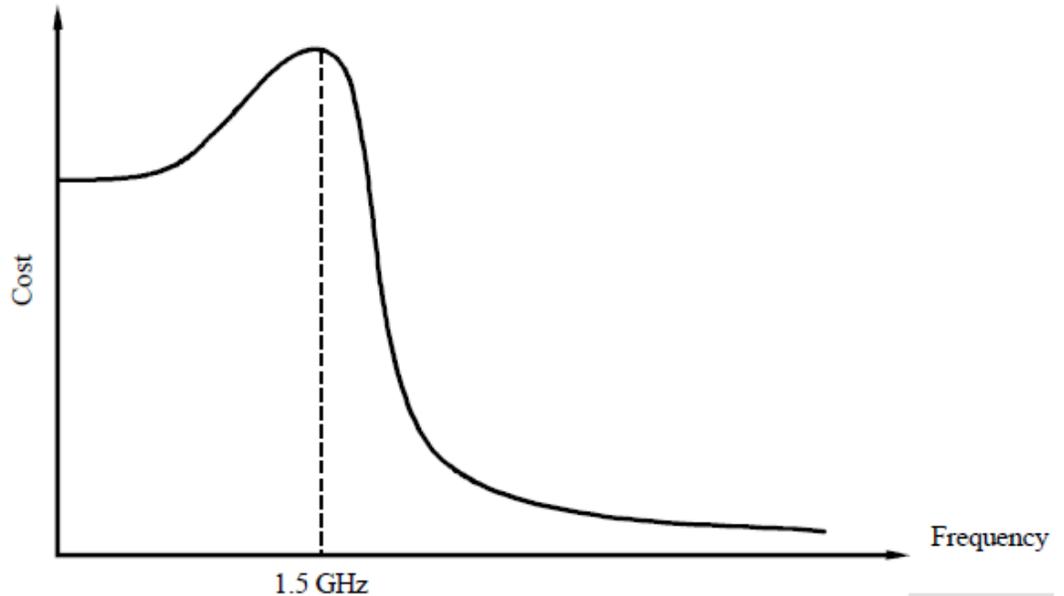
Frequency Ranges		FREQ Factor
From	To	
30 MHz	174 MHz	1
174 MHz	880 MHz	0.75
880 MHz	1710 MHz	0.5
1710 MHz	5000 MHz	0.4
5.0 GHz	10.0 GHz	0.3
10.0 GHz	17.0 GHz	0.2
17.0 GHz	21.2 GHz	0.15
21.2 GHz	30.0 GHz	0.1
30.0 GHz	above	0.05

From the Authority's proposed table of FREQ factors it is not clear what the status is of frequencies below 30 MHz. If spectrum fees are not payable for PTP links below 30 MHz this should be clearly stated in the regulation.

c. New proposed FREQ values

Since the spectrum within the "sweet spot" of approximately 700 MHz and 3.5 GHz is considered most valuable, Telkom proposes that the distribution of FREQ factor, as indicated in the graph below, be used as a point of departure since it better reflects the natural properties of the radio frequency spectrum and therefore also the potential commercial

value of the frequency spectrum.¹² This will be in line with the Authority's intention stipulated in section 6 of the discussion document (Intentions of the Authority) that AIP reflects the relative value of the spectrum.



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The formulae to be applied in calculating the FREQ factors are given by:

For a centre frequency f (kHz) less than, or equal to, 1.5 GHz:

$$F(f) = 0.05 + 0.011 \times 10^{-6 \left(\log \left(\frac{f}{1500000} \right) \right)^2}$$

For a centre frequency f (kHz) greater than 1.5 GHz:

$$F(f) = 0.001 + 0.06 \times 10^{-6 \left(\log \left(\frac{f}{1500000} \right) \right)^2}$$

¹² This graph and associated formulae was obtained from Report ITU-R SM.2012-2 (page 98)

These formulae may also be adapted to more accurately reflect the South African scenario. The importance of the formulae is that it more accurately reflects the commercial value of the radio frequency spectrum for both point-to-point and point-to-area systems. Nevertheless, it should be noted that, within the “sweet spot” (700 MHz – 3500 MHz) there are sub-bands with very high commercial value, for example those frequency bands used for mobile services such as GSM and 3G. These frequency bands could potentially be charged and increased fee to reflect its economic value. On the other hand, there are also communications frequency bands within the sweet spot that has less commercial value, such as for example the DECT frequency band, which should be charged less, in order to reflect its lesser economic value.

In the discussion document¹³ the Authority states that the intention behind the adoption of AIP is to “*encourage efficient use of the spectrum*” and in that the price “*will encourage users to choose the most cost efficient spectrum location*”. The Authority then continue by noting that, in some countries, some commercial frequency bands are priced higher than lower frequency bands due to their increased commercial value. The Authority then opted not to implement this since “*GSM and other cellular technologies make very efficient use of spectrum and have been instrumental in bringing telecommunications to all areas of South Africa*”¹⁴. This raises a few concerns:

- The two statements are in contradiction to each other. It is Telkom’s opinion that, if the Authority wishes to encourage users to choose the most efficient spectrum while the commercially more attractive bands are priced lower, it defeats the entire objective. Telkom wishes to contest that, because of its commercial value, the GSM

¹³ Discussion document, section 4, p7 (“Frequency band”)

¹⁴ See footnote on p7 of the discussion document

900 MHz frequency band is currently higher than any other frequency band below 900 MHz. This is also against the Authority's "intention" as stated in section 6 of the discussion document.¹⁵

- The claim is made that GSM is making "efficient" use of spectrum. Telkom wants to also contest this claim. There are currently more spectral efficient technologies such as W-CDMA that could use the 900 MHz frequency band. Therefore, what is the definition of the term "efficient" and "effective", which are terms used frequently throughout this document? Telkom recommends that the Authority define these terms and explain the basis of the claims.
- The fact that GSM was "*instrumental in bringing telecommunications to all areas of South Africa*" (see footnote on p7 of discussion document) is not argued. However, it would seem that the Authority is favouring one specific technology and thereby opted not to implement the best possible policy.

4.8.3 Geographic factor (GEO) (sub-section 8(c))

Telkom supports the notion that spectrum in rural areas is generally less congested than that in urban areas. Telkom also supports the principle of defining these areas per provisional or municipal boundary in order to avoid any doubt in determining these areas.

Telkom could support a GEO factor value equal to 1 for the High Density areas but would request the Authority to consider reducing the factor value for Low Density areas as low as possible but in any case not higher than 0.1. Whereas this is not based on any scientific calculation Telkom proposes this value because:

¹⁵ Discussion document, p10, section 6 ("*...move to AIP that reflects the relative value of the spectrum*")

- it will reduce the input cost of doing business in rural areas and will therefore support the development of business cases for these areas;
- it will support Government's goal to extend and foster economic activity in the poorer rural areas;
- generally spectrum is available in these areas;
- most access frequency bands are assigned on a national basis a GEO factor of 1 will apply to all the major access frequency bands (e.g. mobile, FWA, etc.).

Telkom is concerned that the medium density areas have not been defined and are also not addressed in other regulatory efforts (such as USAASA). It is also not clear when these areas will be defined and it is therefore also not possible to determine its impact on spectrum pricing at this stage, safe to say that it will increase overall spectrum pricing (move from GEO value 0.5 to 0.75 for large areas of the country). In line with Telkom's proposal to change the GEO Factor Value for Low Density to 0.1, Telkom recommends that the Medium Density area category be deleted. In case the Authority insists in having the medium density area it is recommended that the value for the medium density area be reduced to 0.5.

It is stated that, where more than one GEO factor is included, the highest GEO value should always be used. Although Telkom can support the intention from a practical point of view, it should be noted that it will penalise operators operating on a national basis since the GEO factor will always be 1 in this case. There will therefore be no positive incentive in terms of a reduced frequency price for the rural and less populated areas. It is recommended that the Authority consider implementing a methodology that will further incentivise operators to also deploy networks in the rural areas through by using, for example, a modified GEO factor for rural areas where the point-to-area formula is applied nationally.

4.8.4 Congestion factor (CG) (sub-section 8(d))

a. General implementation of the CG factor

Whereas Telkom can support the principle behind this factor it is concerned regarding its implementation. If the idea is to apply the “congestion” criteria only when an application is made, which seems to be the suggested approach, Telkom could support the use of this factor.

However, if “congestion” will also impact the existing users of the particular frequency band, Telkom has serious objections to its use and implementation. If a frequency band is not “congested” today but becomes congested in the future due to additional applications being submitted, it will result in an immediate 50% licence fee increase for existing licensees. Depending on the amount of bandwidth assigned to an operator, the 50% increase could run to tens of millions of Rands annually. This uncertainty will make it very difficult for operators to determine a business case and will also have implications on multi-year customer contracts in that it may not be possible to change these contracts in line with the change in spectrum charge.

b. Application of CG factor in point-to-area formula

In the case of, for example, applications for 3.5 GHz, many applications could have been submitted only to “get into the queue” and may never even materialise or be realistic. These “artificial” applications could have a significant effect on existing operator’s spectrum fees and should be avoided. As another example, even if Telkom know that the 900 MHz GSM band has been fully assigned to the three mobile cellular operators and that no spectrum is available in this band will an application from

Telkom immediately increase the spectrum fee for the current users of the band by 50% since there is now a “waiting list”?

Furthermore, the application of auctions, as indicated in the discussion document and draft regulations, will resolve the issue of a “waiting list” for these high demand frequency bands. Telkom therefore recommends that the CG factor be deleted from the point-to-area formula.

c. Application of CG factor in point-to-point formula

In the context of PTP frequency bands CG is very difficult to apply since you may find congestion in one area of the country where demand is high but there will always be room to make additional assignments in other areas of the country. Does this constitute congestion and a waiting list? Also, in the case of PTP systems there will in all probability be another frequency band that could be used to satisfy the request.

Even when a PTP frequency band is fully assigned as block allocations, there will be alternative frequency bands where the demand could be satisfied.

Telkom therefore recommends that the CG factor be deleted from the proposed point-to-point formula.

4.8.5 Degree of sharing (SHR) (sub-section 8(e))

Telkom supports the 50% discount when spectrum is shared between two or more spectrum licensees. Telkom would however request the Authority to clarify the following sharing issues in the final regulation:

- Is sharing considered only within the same ITU service category (e.g. fixed versus fixed) or also across services (e.g. fixed versus satellite)? For example, when a frequency band is shared between

fixed services and satellite services it is considered as “shared” and the 50% discount should therefore apply. Telkom supports this principle since it supports more effective use of the spectrum by accommodating more users and puts constraints on all users of the spectrum.

- The application of the SHR factor is not clear in all cases. For example, when a frequency band is shared between many users but each has been assigned an exclusive block allocation, or even one or two individual channels, within the band, does this constitute “sharing” and therefore the 0.5 SHR factor will apply? If this is not the case, then there is a double penalty since the ASTER factor will also apply. As another example, what if the same frequency band is shared on a regional or area basis between many operators? Although each has exclusive rights in some areas, the band is still “shared”. This is the same principle of PTP links where one operator uses a frequency on one link and therefore no one else can technically use that same frequency on the same link (because of the sterilisation factor, although ASTER does not apply for PTP links).

Telkom recommends that SHR should apply in all cases where a frequency band is shared between users, even between different services.

4.8.6 Area Sterilized (ASTER) (sub-section 8(f))

Telkom has several concerns with the ASTER factor including:

a. Calculation of area

Telkom foresees that the ASTER factor could lead to many protracted disputes between the industry and the Authority in that it makes several assumptions that simply do not reconcile with reality as follows:

- From the information provided in the draft regulation it is not clear how “area” will be calculated. Sterilised areas must be specified based on receiver threshold or protection levels, which depend on technology and equipment. The draft regulations are silent on what level will be used and how this will be specified. For example, the area can be determined by calculating to the thermal threshold of the receiver to be protected or by specifying a C/I level.
- In the discussion document it is mentioned that the licensee shall submit their system description and transmit power figures from which the Authority shall estimate the area covered by the transmitter.¹⁶ It is however not stipulated how the Authority will estimate the area (what cut-off point will be used).
- It is also not clear whether “Area” is calculated differently between sectorised and omni-directional cells; however, it appears the formula presumes a πr^2 method. Presuming a simplified πr^2 method is used, there is no indication of how the radius would be calculated for different system types.
- The antenna performance can significantly influence the area covered by a transmitter, even the unintentional areas. It should be noted that these high performance antennas are much more expensive than standard or lower performance antenna and therefore this should be factored into the calculation through incentivising operators to opt for high performance antennas.
- It is natural to assume that the Authority would follow a theoretical i.e. mathematical approach in calculating the area. In particular the Authority, not having a view of the actual coverage map of operators would not be able to account for environmental effects e.g. multipath, shadowing, mountainous terrain etc.

¹⁶ Discussion document, section 7.2.6, 6th paragraph

- There is an implicit assumption that given a frequency, all cell sizes are the same. This approach does not account for the fact that as operators build their networks so more based stations and towers are added the average cell size shrinks.
- Telkom respectfully wish to state that the Authority would require an extensive amount of resources, such as frequency planning tools and expertise in terms of human resources to make the necessary determinations. Telkom's experience in this regards is that even using planning equipment, the software may not necessarily be accurate and estimates of coverage (and hence average cell size) can be off from software predictions.

Given these variables, operators are likely to constantly disagree with the Authority on the area sterilized.

b. ASTER factor

Telkom has concerns regarding the ASTER values for a number of reasons namely:

- It is not indicated how the ASTER factor values have been determined. This is important considering the tremendous impact that this value has on the calculation of point-to-area spectrum fees. Telkom recommends that the background regarding the calculation of this factor be provided. In particular, the ASTER value of 600 seems very high and should be reduced.
- Considering the differences between <1km and >1 km is a factor of 3.33 and between <10km and >10km is a factor of 3.0 a very small change in area (potentially only a few m²) could mean a substantial difference in the spectrum fee payable (factor of up to 3.33).
- It is not clear how the ASTER value will be determined and applied where an operator has more than one base station. Will the total area coverage of all individual base stations be added to determine

the ASTER value or will the formula be applied for each individual base station in question? To illustrate this, assume an operator wishes to deploy a system with a coverage radius of 20 km (Area = 1257 km²/base station). According to the table the ASTER factor is therefore 56. Let's assume also the company has 11 base stations across the country. If the formula is applied to each individual base station (as for PTP links which is calculated for each link) it means that it will make more financial sense for the operator to opt for national coverage (national sterilisation) and therefore use the ASTER factor of 600, although it has only 11 base stations (11 x 56 = 616). On the other hand, if the total area of all 11 base stations are added (13,827 km²) the ASTER value from the table is 180. Since the latter method does not make sense from a frequency use point of view Telkom assumes that the first methodology will apply. Because of the ratios between the various factors it will actually promote inefficient use of spectrum since most operators will opt for the national coverage, even if only a limited number of base stations will be deployed, because of the low break-even point. This matter need to be clarified in the regulations.

c. National coverage

The table allows only for an area up to 1,000,000 km². The total land area for South Africa is more than 1,200,000 km² and it is therefore suggested to increase the last entry to allow for national coverage, which will be applied for many frequency bands.

It is also noted that the proposed SKA and/or MeerKAT project will create radio quiet zones in the entire Northern Cape where operators will be restricted or limited to deploy radio communication services. When considering that the Northern Cape covers almost 30% of South

Africa, it should be accounted for in the area coverage when applicable. The necessary provisions should be made for this.

Telkom recommends that the formula to be used by the Authority to calculate the ASTER value should be provided to ensure that there is no ambiguity. It is even more concerning to see that the Authority will “estimate” the area covered by the transmitter (see p16, section 7.2.6 of discussion document).

d. Provincial coverage

Another concern with the broadly defined coverage areas is that it does not relate to population density or economic activity. For example, an operator decides to cherry pick and provides services only in Gauteng, which covers only 1.4% of South Africa (or approximately 16,800 km²) but has 20.2% of the total population. This means that an ASTER factor of 180 will apply for Gauteng. Similarly, KwaZulu-Natal, with an area of approximately 91,200 km² and a population of 20.9%, will apply the same factor of 180. An operator wishing to provide services only in the Western Cape on the other hand (approximately 127,200 km² or 10.6% of total area) will apply to an ASTER factor of 400, even if only 10.1% of the population lives in the Western Cape. Furthermore, because the next crossover point in area table is only at 500,000 km², it implies that, an operator providing services in the Western Cape could also request for Gauteng and KwaZulu-Natal to be included since the total area will still result in a ASTER factor of 400 (total area is 235,200 km²), even if there is no intention to provide services in the other provinces. This will result in spectrum hoarding.

An operator targeting Western Cape will pay more for its spectrum compared to an operator in Gauteng, although double the number of people living in Gauteng lives in only 1/10th the area. It is therefore

recommended that population density be included in the formulae or, alternatively, the ranges have to re-work to ensure a smoother glide curve for the ASTER area.

e. Editorial

It is noted that the last entry is 100,000 to 1,000,000, which should be 500,000 to 1,000,000.

It is also noted that the draft regulation contain no detail pertaining to the implementation of the ASTER factor, except for the table itself containing the proposed ASTER areas and values. All background information regarding the application of the ASTER factor is contained in the discussion document (even if limited), which is a concern (see Telkom's comments in section 3.1.3

4.8.7 Minimum hop length (HOPMIN) (sub-section 8(g))

Telkom supports the introduction of this factor and has always attempted to optimise the use of frequency spectrum by using the appropriate frequency band for the required hop length. Since the main objective of these regulations is to motivate effective use of the radio frequency spectrum through incentives, Telkom proposes that the SQRT formulae should be applied, not only in the negative sense (operator penalised) but also in the positive sense (operator credited).

Therefore, where a PTP link is above the minimum specified hop length an operator should be credited with the same SQRT formula. For example, if the minimum hop length is 3 km (23 GHz) and the actual hop length is 5 km then $HOPMIN = \sqrt{3/5} = 0.77$. Considering the huge ranges that are possible for every frequency band throughout the country (due to, for example, different propagation conditions, service level agreements, rain

rate, topography, etc.) the application of Telkom's proposed methodology would promote the operators to "stretch" the radio links as much as possible in all frequency bands. Since the draft regulation is silent on this scenario it is recommended that this matter specifically be included in the regulations.

The Frequency band in the table is expressed in "MHz" whereas almost all bands are actually in "GHz" and must be corrected.

4.8.8 Unidirectional factor (UNIBI) (sub-section 8(h))

In principle Telkom could support this factor and its proposed values if it applied to "one-way communications" only, as also indicated in the discussion document.¹⁷ The unidirectional factor should therefore only be applied to those systems using only one leg of an FDD allocation. Where TDD systems are deployed in either a TDD band or in both FDD blocks the bi-directional values must still apply since these are two-way communications. This is currently the case in, for example, the 3.5 GHz band where an FDD channel arrangement has been specified although these FDD assignments could be used for either FDD or TDD systems. The concern is that some pertinent detail, as contained in the discussion document, is not captured in the draft regulation (see also Telkom's comments in section 3.1.3).

4.9 Minimum fees (section 9)

According to the discussion document¹⁸ a minimum fee is proposed to ensure cost recovery. It is also mentioned that, in setting the minimum price, comparison to regional and international ranges were considered. Considering that there is no relationship between ICASAs operating costs

¹⁷ Discussion document, section 7.2.7.2, p19

¹⁸ Discussion document, Section 7.3, page 20

and international ranges, it is unclear how this minimum fee was determined. Furthermore, for the purpose of transparency, Telkom recommends that the Authority present the results of calculating these operating costs since cost recovery is also claimed for other spectrum users.

4.10 Multi Year Licences (section 10)

In considering the discount methodology employed by the Authority in determining the multiplier used when spectrum fees are paid in advance, Telkom comes to the conclusion that whereas there is a nominal discount, there is in effect no real discount, and thus no incentive for operators to pay for multi-year licences. Although the regulation is correct in employing a Net Present Value (NPV) formulation, the “discount rate” employed is essentially set too low. The real discount operators enjoy is the difference between the expected inflation rate over the time horizon employed and the nominal discount rate i.e.:

$$\text{Real discount} = \text{discount rate} - \text{expected inflation rate (ir)}$$

Historically inflation has averaged 10% in South Africa and, although the recent inflation targeting policies of the South African Reserve Bank have brought the average rate down a few percentage points, there is insufficient historical evidence to indicate that the trend is permanent. In addition, consider that in paying for multi-year licenses operators incur a liquidity premium (lp) in that their monies are paid and cannot be recovered e.g. if the revenues they predict associated with new product do not materialise.

An inflation risk premium (ip) in that there is a risk that inflation will breach the expected value, which would reduce the real discount. Hence the discount rate should be constructed as:

$$\text{Nominal Discount rate} = \text{expected ir} + \text{lp} + \text{ip} + \text{Real discount}$$

Telkom is of the view that one would probably require a nominal discount rate of at least 15% and probably closer to the industry Weighted Average Cost of Capital to incentivise operators to adopt multi-year licenses.

4.11 Table of fees by Type of Radio frequency Licence (section 11)

a. General comments on table

According to section 16 of the draft regulation (*“Repeal and Amendment”*) the intention is to repeal Regulation E1 of Chapter 6 of the Radio Regulations published in Government Gazette No. 2862 of 28 December 1979. It is also clear that the Table from Regulation E1 will remain in the final regulation (as contained in section 11 of the draft regulation).

The positive aspect of retaining the table in the final regulation is that existing users of radio communications equipment will know what formula to apply going forward. However, keeping the table in its suggested format does create a major concern regarding the applicability of the draft regulations to those services not listed in the table.

There are several radio communication services in used in South Africa (as recorded in the South African Table of Frequency Allocations or SATFA) that are not currently listed in the table in section 11 of the draft regulations. Whereas the proposed formulae, as contained in section 6 of the draft regulations, could be applied to most or even all of these different services not listed, it is not clear whether the spectrum fee regulations apply only to those services currently listed in the table or also to those services not listed in the table. For example, radio communication services such as radar systems are not listed in the table

although the point-to-area formula could be applied. Telkom for example operate two radar systems at its cable landing stations and is currently paying a flat rate for these. There are several other services and applications, for example mobile applications, which are not specifically listed in the table and it may not be clear how to apply the proposed formulae to these services and applications.

Telkom therefore recommends that the final regulation clearly stipulates that the purpose of the table is only for information regarding existing services and applications and that the regulation will apply to all users of the radio frequency spectrum, unless there is a specific exemption made in section 5 (“Exceptions”) of the draft regulations. It is noted that only “VSAT” was added to the original table.

b. Specific comments on table

▪ **Regarding section 3.2(iv)(d)**

It is stated that the point-to-area formula will apply to the specified HF stations. Considering the unique propagation of HF frequencies it is not clear how the “Area” for the ASTER value will be calculated when using HF. Furthermore, HF frequencies (3 – 30 MHz) are excluded from the FREQ table and it is therefore not clear what value will be used as FREQ factor.

This also applies to section 3.5(v)(d).

▪ **Regarding section 3.12 (Radio Link Station)**

It would seem that the point-to-point formula should also apply for every link as is the case in section 3.11 of the table. “Point-to-point Formula” should therefore read “Point-to-point Formula for each link”.

▪ **Regarding section 5.8 (Electronic Communications Network)**

It is noted that an ECN should apply the “point-to-area using maximum ASTER value” (i.e. 600). The intent of this statement is not clear and should be clarified. Does this imply that all ECN networks should only apply the point-to-area formula and always use the $ASTER = 600$ (i.e. national coverage)? The implication of this statement is that it leaves no room for any ECN operator to use the point-to-point formula for link-by-link calculations or to apply for coverage other than national.

4.12 Short title and commencement (section 15)

It is important to accept that it will take operators a while to adjust their business models in order to meet the proposed pricing regulations. Accordingly, ICASA cannot expect to have spectrum licence Regulation address historic inefficient use that have been ongoing for a more than a decade.

For ICASA to reach the end goal of where they want to be w.r.t efficient utilisation of spectrum, and penalising those that are not using it in that manner, ICASA should give due consideration to historic dispensation and the use of the spectrum. The commencement of these Regulations should be such that operators have enough time to implement changes in business models, spectrum usage patterns, etc.

END