GENERAL NOTICE

NOTICE 828 OF 2010

DRAFT RADIO FREQUENCY SPECTRUM LICENCE FEES EXPLANATORY MEMORANDUM

1 Introduction

The Authority intends to publish a regulation introducing radio frequency spectrum fees for frequencies classified as "broadcasting service radio frequencies bands". The Electronic communications Act No 36 0f 2005 defines broadcasting service radio frequency bands as, " that part of the electromagnetic radio frequency spectrum which is allocated for the use of broadcasting services by the Authority, taking into account the ITU table of allotment, in so far as such allocation has been agreed to or approved by the Republic". The following frequency bands are classified as broadcasting service radio frequency bands in the ITU table of allocation and in the South African Table of Frequency Allocations (SATFA):

- AM-MF(MW) Sound Broadcasting 535,5 - 1606,5 KHz
- VHF/FM Sound Broadcasting 87,5 - 108 MHz
- VHF Television Broadcasting 174- 238 MHz; 246 - 254 MHz
- UHF Television Broadcasting 470 - 854 MHz.

In addition to the fees set by the Authority (Administrative Pricing) which are the subject of this document, it is envisaged that the fees for parts of the spectrum where demand exceeds supply may be set by an Auction process.

2 Role of Spectrum Pricing

Spectrum prices are intended to fulfil a range of purposes including the following:

- They should cover the administrative costs required to plan and manage the relevant part of the spectrum, and the amount of frequency that is used. As more frequency is used the greater the problems of monitoring and managing interference and the cost of spectrum management and monitoring rises over time accordingly.
- They should encourage efficient and effective utilization of spectrum, encouraging, on an incentive basis, migration to lesser populated and low-

demand bands. This amongst other things includes a variable factor that is built-in to encourage the use of higher frequencies in order to reduce the crowding at lower frequencies.

- They may also reflect the economic value of the spectrum in terms of the potential price users are prepared to pay.
- At the same time, the spectrum fees should not be a barrier to economic development, innovation, historically disadvantaged groups and the dispersal of economic activity over the whole country.

3 Methods of Spectrum Pricing

There are various methods of spectrum pricing employed worldwide. The definitions below are intended to clearly distinguish between the different methods.

Spectrum pricing is a generic term currently used to denote the denoting of the use of pricing as a spectrum management tool. It covers both *administrative incentive pricing* and *auctions* of either *apparatus licences* or *spectrum rights.*

Administrative pricing: is a form of *spectrum pricing* in which *equipment licence* fees or charges for *spectrum rights* are set by the spectrum manager (Le. ICASA). Administrative pricing may include such variants as:

- *Shadow pricing* (A form of administrative pricing in which the price is set according to a predetermined formula intended to mimic the effect of market forces).
- *Administrative incentive pricing,* where fees are set with the intention.of promoting efficient spectrum use.
- *Regulatory pricing,* where fees are set unrelated to market considerations, for example to recover spectrum management costs.

Auctions are a form of *spectrum pricing* - as well as a spectrum assignment mechanism1 - in which *apparatus licences* or *spectrum rights* are assigned to the winner(s) of a competitive process selected on the basis of price.

The *focus of this discussion and the regulation is primarily on Administrative Pricing.*

The Authority proposes that the initial once-off application fees should continue to reflect the costs to the Authority of making an assignment and issuing a licence.

For the annual Radio Frequency Spectrum Licence Fees, the Authority considers that the appropriate method of setting these fees is 'Administrative Incentive Pricing (AIP), the essential features of which are described below.

Although the spectrum fees are not intended to raise extra revenue for the national fiscus, there is a general principle that the application and annual fees in total should at least cover the cost of spectrum management and monitoring activities. However, given the features of Administered Incentive Pricing, the spectrum fees collected may overshoot the cost of spectrum management and monitoring.

4 Administrative Incentive Pricing

Administrative Incentive Prices (AIP) are a major tool of spectrum management that aim to:

- Reflect the relative value of spectrum bands and bring demand in line with supply.
- Promote efficient use of spectrum
- Prevent stockpiling of spectrum
- Provide incentives to move to less congested spectrum
- Provide incentives to hand back spectrum that is not needed
- Encourage users to switch to spectrally efficient technologies

In AIP the general method is to calculate the spectrum fee by taking into account a range of factors , including but not limited to:

- **Frequency Band**
    - Charges vary with band (spectrum location
    - As AIP is intended to encourage efficient use of spectrum, the relative pricing of frequency bands will encourage users to choose the most cost efficient spectrum location.
    - All things being equal, the lower the frequency band, the higher the value due to better propagation and scarcity.

- In some methodologies, commercial frequency bands - especially those used for such as GSM and 3G - are priced higher than lower frequency bands due to their commercial value.

- **Power Output or Area Sterilized**
  - Charges vary according to Power Output
  - Alternatively, the charges can increase with the area sterilized

- **Bandwidth used**
  - Charges vary according to bandwidth use. The more bandwidth used, the higher the price although international practice varies from increasing the price per KHz of bandwidth with the volume used, to applying an effective discount per KHz with the volume used.

- **Geographical area**
  - There are different charges per Geographic area
  - In most large countries, the spectrum is congested in the high density metropolitan areas and almost empty in remote rural areas. As a result, the spectrum charges differ according to whether the geographical area is congested or not, although this factor is not applicable for very low frequencies.

- **Exclusive rights or sharing**
  - The spectrum charge varies according to whether the spectrum is exclusive or shared.

- **Supply and demand**
  - The spectrum charge reflects the demand for the frequency band.

- **Duration**
  - The spectrum charge varies according to the length of time in which the licence is in force. In the case of annual spectrum fees, common practice is to give a discount where the annual fee is paid in advance.

- **Services (value of)**
  - Where the spectrum fee reflects the perceived value of the services that use the spectrum. This is practiced for Cellular (GSM, 3G etc.) services in some countries, although the Authority does not intend to include a specific factor to reflect the value of the service in the spectrum fee.

- **Specific factors**
  - includes government usage, where the spectrum fee may be lower or waived altogether. This includes aeronautical and maritime exclusive international assignments that are used only for specific applications and where pricing incentives have no role as there will be no changes in the frequency allocation.

5 The current licence fee structure

The spectrum fees for Electronic Communications Service and Electronic Communications Network Service Licences are currently as contained in the Regulations on Radio Frequency Spectrum Fees For Electronic Communications Service and Electronic Communications Network Service Licensees published in Government Gazette No. in terms of the Electronic Communications Act.

The licensees are currently not paying for the use of broadcasting service radio frequencies bands.

6 Intentions of the Authority

The intention of the Authority is to revise the structure of the annual Radio Frequency Spectrum Licence Fees in order to:

- encourage efficient and effective utilization of spectrum. encouraging, on an incentive basis migration to lesser populated and low-demand bands and
- At least cover the costs to ICASA for monitoring, interference investigations. International coordination, ITU membership and policy development.

The Authority is minded to move to Administrative Incentive Prices that reflect the relative value of the spectrum in view of the growing scarcity of the spectrum resource in certain frequencies and geographical areas. Where there is perceived to be competition for a given frequency and the demand is greater than the supply, the Authority may choose to assign the frequency on a competitive basis where the annual Radio Frequency Spectrum Licence Fee is determined in an Auction process.

This provides a transparent and objective basis for allocating the resource among users. Generally, consumers and third-party commercial providers that place the greatest value on the resource (typically those that can be expected to either use it most efficiently or maximise its commercial value to the benefit of consumers) will pay a value-based rate. For exclusive frequencies, this may be a rate above what all other service providers are willing to pay; and value-based pricing provides a mechanism for compensating the public for the resource that has been rented out to consumers or service providers.

7 Proposals for Revised Radio Frequency Spectrum Licence Fees

7.1 General

- The Radio Frequency Spectrum Licence Fees will move from a pricing system based on both apparatus and spectrum to one centred around spectrum, and

more specifically on the extent of spectrum denied to others by a given licensee.

- While most of the radio frequency spectrum will be priced according to spectrum. A large proportion of smaller individual licensees will be charged the minimum fee.
- The new system also intends that all users of spectrum should in principle pay for spectrum on an equitable basis and (amongst other things) this will result in the difference between bulk and other users being removed.
- The new pricing process will mean that some licensees will pay more for their use of spectrum while some will pay less. These prices, especially the Minimum Prices, are much lower than those levied in other administrations such as Kenya.

7.2 Parameters

The following parameters have been identified and are used to calculate the Radio Frequency Spectrum Licence Fees to be levied:

- Bandwidth (BW)
- Frequency factor (FREQ)
- Geographic factor (GEO)
- Congestion factor (CG)
- Degree of sharing (SHR)
- Area sterilized (ASTER)
- Minimum Hop Length (HOPMINI)
- Single link factor (UNIBI)

These parameters will be termed factors and are applied within formulae. In addition, there will be a minimum fee and a discount scheme extended to licensees who wish to pay for several years in advance. A Unit Price (UNIT) is applied to these factors to derive the price.

7.2.1 Bandwidth (BW)

While a radio signal is said to be transmitted at a given frequency, the information carried spreads around that frequency. Bandwidth is a measure of the band over which the information spreads around a given carrier frequency. The lesser the spread is, the smaller the bandwidth occupied and denied to others. Hence, the scarcity of radio resources in a frequency band is a direct implication of more bandwidth being used, whether it is a large band spread around one frequency or spaced-out frequencies with contiguous band spreads. In either case, the more bandwidth is assigned to licensees in a frequency band, the less is available for new assignments. Of the many conceivable ways of factoring bandwidth into the price of spectrum, regulators usually adopt one of the following:

- A linear approach: all else being equal, spectrum price is proportionate to amount of bandwidth used.
- A discount for large bandwidth approach: the more the bandwidth, the less the price per unit. This approach does little to encourage spectrum efficiency, especially in conditions of scarcity.
- A premium for large bandwidth approach: licensees requesting large bandwidths pay a premium. This approach discourages licensees to hoard spectrum, but may raise transparency and objectivity questions as to the amount of the appropriate premium.

The linear approach is proposed by the Authority, with the clear advantage of fairness. Spectrum hoarding can be avoided by setting appropriate price levels or by implementing market competition rules when demand rises dramatically.

7.2.2 Frequency factor (FREQ)

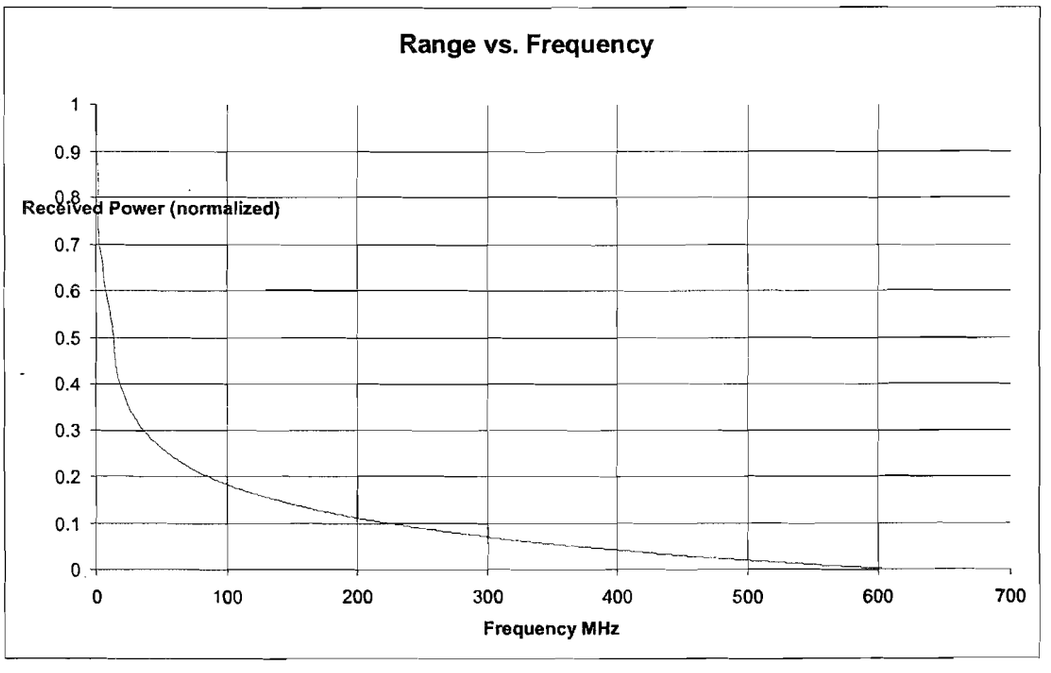
How far a signal goes is determined by several factors, the most universal of which are the frequency, transmit power and propagation environment. All other things being equal, the higher the frequency, the shorter the wave length and the more difficult it is at the receiving end to pick the signal up due to the smaller aperture area.

At low frequencies, larger areas can be covered (longer ranges can be achieved for fixed links) than at high frequencies. As a consequence, deploying a system at a low frequency could require fewer infrastructures than at high frequencies. This property makes the low frequencies more attractive.

Since range is the advantage here, quantifying the frequency factor requires knowledge of what affects range and how. For universality and simplicity, free space propagation is assumed:

- Path Loss = Constant + 20*Log (Distance) +20*Log (Frequency
- The frequency factor can then be assumed to be a normalized version of the receive power.

Note that the Decibel function is chosen here rather than the linear formula to smooth out the effect of signal variation at high frequencies.



Assuming a transmit power reference and a static distance, different frequencies will result in different path losses from which the received signal levels can be derived.

For convenience of use, ranges have been defined. The main challenge is to select the ranges so as to contain bands allocated for the same purpose. By doing so, there will be only minimal disparity between licensees using different frequency

bands to deliver the same services. However, when the difference in frequency band locations is significant (e.g. alarms in UHF band and also in VHF), the frequency factor should not be used as a levelling tool and different FREQ factor values may need to be applied.

The following are the ranges for the frequency band factor:

Frequency Ranges		FREQ Factor
From	To	
30 MHz	174 MHz	1
174 MHz	880 MHz	0.75
880 MHz	1.8 GHz	0.5
1.8 GHz	5 GHz	0.4
5 GHz	10 GHz	0.3
10 GHz	17 GHz	0.2
17 GHz	23 GHz	0.15
23 GHz	30 GHz	0.1
30 GHz	above	0.05

7.2.3 Geographic factor (GEO)

South Africa encompasses considerable geographic and social variation, with:

- A major population centre defined by Gauteng with a high density of population and economic activity.
- other major metropolitan areas in Cape Town and Durban
- A range of third tier cities

- Rural areas with a high density
- Rural areas with a low population density

The most intense use of radio based communications is in the major metropolitan areas. The use is less intense elsewhere and for socio-economic reasons the intensity of use does not vary significantly between the rural areas with a high population density and those with a low population density. The government's goal is to extend to foster economic activity and the use of technology to the poorer rural areas. Geographic factors can be applied that both meet the socio-economic goals and the goal of efficient use of spectrum, because the areas where there is less pressure on the radio frequency are also the poorer areas and a lower geographic factor can be applied.

The following is a table of suggested geographic factors:

GEO	GEO Factor Value
High Density	1
Low Density	0.1

It is proposed that:

- High Density will be all Gauteng province and the municipal areas of Cape Town and Durban
- Low Density is the rest of South Africa

Where an assignment covers more than one type of area, the GEO factor will reflect the higher value area: this ruling also applies to nationwide assignments.

7.2.4 Congestion factor (CG)

In some areas (irrespective of the geographic dimension), radio frequency spectrum could become scarce or unavailable. Demand exceeding supply is an indication of value of an item on the market. In the case of spectrum, both current and

prospective licensees should be aware of its value and be prepared to pay for it. This factor is either neutral (Le. 1) when there is still radio frequency spectrum available or higher than 1 when there is shortage of spectrum. In other words, wherever there is a waiting list for access to spectrum, prices are automatically 50% higher than the base price.

The following is a table of suggested factors:

CONGESTION	CG Factor Value
Congested	1.5
Not Congested	1

'Congested' indicates the existence of a waiting list, while 'Not Congested' identifies cases where demand for spectrum has not yet surpassed supply yet (i.e. no waiting list).

7.2.5 Degree of sharing (SHR)

The exclusive use of radio frequency spectrum across a geographical area refers to the impossibility to assign a given frequency to more than one user. By their nature, some radio services tolerate frequency sharing in the sense that more than one licensee can use the spectrum for communications in the same geographical area without undue interference to concurrent licensees. Some services lend themselves naturally to such uses because of the traffic load on the systems or the very short range of the equipments. The extent to which this is possible is usually a function of the load pattern of the system, the degree to which the exchanged signals are scattered and the localized nature of the communications. In systems where communications are brief or are relatively distributed in geographical silos rather than flowing to and from a central point, it is possible for several licensees to operate equipment on the same frequency.

Whenever shared usage is possible, spectrum is used efficiently as a direct result of not having to assign different frequencies to different licensees, but effectively

sharing one frequency among licensee groups. In line with its policy of giving an incentive for efficiency and sparing use of spectrum, the Authority proposes to operate a price discount policy when two or more licensees opt to share spectrum.

However, if the fee per user-as a result of sharing discount is a direct division of the overall fee for the shared channel by the number of sharing licensees, administration would become overcomplicated with wide price variations from area to area depending on the sharing dynamics. Therefore the Authority proposes to set the sharing discount to be 50%. This value is the sharing coefficient when two licensees share spectrum and still offers a significant discount to the full price when more than two licensees are involved.

Sharing	Value of sharing factor
Exclusive	1
Shared	0.5

7.2.6 Area sterilized (ASTER)

In radio, the idea of area sterilized refers to the area over which a given transmitting station radiates. Intuitively a wireless communication between any two equipments whether fixed or mobile requires a link between both. When the receiving apparatus are mobile or when their number is large, it is more cost-effective for the transmitting station to cover an entire area rather than maintain several physical links with each transmitter. In practice, most point-to-area systems are built to radiate all around the base stations (omni-coverage) or in partitions (sectors around the base station).

This suggests that pricing should reflect the extent of the area over which the Authority is bound to monitor and guarantee minimum interference levels.

Furthermore, the use of a frequency across a geographical area makes it difficult or simply impossible in some cases to have another licensee use the same frequency in the same area. In other words, the use of spectrum usually carries the notion of exclusivity over a given area. As a consequence, spectrum pricing should be

function of the area over which each specific chunk of spectrum is denied to all other licensees-the area sterilized.

One of the reasons for congestion is the expanse of the area sterilized. The larger the area sterilized, the more difficult it is to re-use frequencies.

In order to promote spectrum efficiency and a sparing use of limited spectrum, the area sterilized should be factored into the price of spectrum. For convenience and implementation simplicity, the area ranges are intended to allow easy application at the local, provincial and even national level.

The prospective licensee shall submit their system description including the location of their radio base stations as well as transmit power figures. The Authority shall estimate the area covered by the transmitters and feed this value into the price algorithm.

To make the pricing process understandable and convenient, ranges are used rather than absolute values. In the first implementation of this algorithm, the ASTER factors are based on radius ranges associated with the area sterilized.

In the long term, the virtual division of the South African territory into geographical units would allow block-wise spectrum units and facilitate wider granting of spectrum assignments with the right for spectrum trading.

The proposed ASTER factors are as follows:

Area (km2)		ASTER Factor
From	To	
0	1	0.6
1	10	2
10	100	6
100	1,000	18
1,000	10,000	56
10,000	100,000	180

100,000	500,000	400
100,000	1,000,000	600

7.2.7 Hop length (fixed links)

In the special case of fixed link services, the footprint of the link is narrower and can be thought of as an ellipsoid between the two ends of the link. A network of fixed links is not geographically continuous in nature but rather like a web with gaps in between. In addition, the usefulness of a fixed link is not a function of how many randomly located receivers it can cover but how well it can link two fixed points. The resource denial here is not necessarily related to geographical overlapping in the sense of area sterilized. Rather, it is an expression of the excessive interference that would be imposed on that other links at the same frequency and installed along the path of a given link. In this case, the length of the link and the bandwidth used are indicative of the constraints it poses on other links in the area.

7.2.7.1 Minimum hop length (HOPMINI)

The frequency factor showed that how well a frequency can be picked up by antenna depends on its wavelength, hence the dependence on the frequency. There are standard maximum transmit power levels and antenna gains for most radio equipments and for fixed links, these limits give an indication of typical ranges. Therefore the length of a link could not be varied indefinitely while using type-approved equipments.

Fixed links are operated at frequencies varying from a few hundreds of megahertz to several tens of gigahertz. In order to ensure an efficient utilization of spectrum, it is helpful to add a dimension other than the frequency factor to pricing. For short links, both lower and higher frequencies could be used. But more radio frequency spectrum is available at high frequencies and long links can only operate at low frequencies. As a result, ensuring that short links do not unnecessarily clutter low

frequencies can help avoid artificial congestions. The minimum path length idea associates a minimum length to fixed links at different frequencies. While licensees could require low frequencies for short links, this is not encouraged and would therefore cost a premium to the licensee. The premium percentage to be paid is the square root of the ratio of the minimum length at the frequency requested to the length of the link requested. This value is always greater than 1.

The square root function has been chosen for the following reason. Signal power is proportional to the inverse square of the distance. The received power is at what matters in picking up a signal so in order to have proportions based on signal power, the square roots of distances need to be taken.

The minimum path lengths are the results of an analysis of the trends in equipment manufacturers and technologies as well as the current installed base of transmission equipments. Aspects such as transmit power, modulation and usual bandwidths have been considered to produce the table. The following is a table of minimum path lengths by frequency. Frequencies not appearing specifically in this table shall be rounded to the next highest value in the table.

Frequency Band (MHz)	Min Path Length (Km)
400	100
800	60
1.4/1.6/2	30
4 and 5	16
7.5	14
10 and 11	10
13/14/15	9
17/18	4
22/23	3
25/26	3
28	2

31 and 32	1.5
38	1
Higher	0

- The minimum hop length is introduced to encourage licensees to use high frequencies for short links.
- If a licensee wishes nonetheless to apply for a license at a lower frequency or if there is congestion in the higher frequencies, a premium shall be paid.
- The premium shall be the square root of the ratio between the minimum path length for the frequency requested and the actual path length of the licensee's link. This is understood as a premium on the price of the actual frequency requested.

Example: A licensee requests a 5GHz link for a hop length of 8 Km

1. The minimum hop length at 5GHz is 16 Km.
2. 8 Km hop lengths are normally assigned at frequencies starting from 17 GHz onward.
3. the licensee may take the next available spectrum from 17 GHz on or insist on assignment in the 5 GHz band but at a premium.
4. For the calculation of the premium:
    a. The minimum length at the requested premium frequency is required. Here the requested premium frequency is 5GHz and the minimum length at 5 GHz is 16 km
    b. The premium fee would then be SQRT(16/8)=1.414 times the normal fee for the 5 GHz band.

The Minimum Hop length factor will be deployed when all the hop lengths have been identified

7.2.7.2 Unidirectional factor (UNIBI)

For specific purposes of one-way communications, a licensee might wish to request a unidirectional link.

For fixed links, such an assignment makes the other leg difficult to use, because most fixed links are bi-directional. While it could be seen as extreme to make a licensee pay for an entire leg they are not using, it is unfair to the regulator and other licensees for a leg of the communication to be idle. Therefore, a licensee requesting a single link should pay more than half the price of a bi-directionallink to reflect the loss of the other leg they are not using and this premium is taken into account in the UNIBI factor as applied to the Point to Point formula.

For assignments other than fixed links, such as paging, the licensee may pay half of the bidirectional fee. This is taken into account in the UNIBI factor as applied to the Point to Area formula.

UNIBI	Value for Point to Point	Value for Point to Area
Unidirectional	0.75	0.5
Bi-directional	1	1

For example, let us assume that a fixed link (bi-directional) costs R1000 at a given frequency and for a given hop length. If a licensee wishes to only use one leg of the link, the price to pay would be 0.75*R1000= R750.

7.3 Minimum price (R)

In the current spectrum pricing, many fees fail to cover the processing costs on ICASA. In order to avoid complicated formulas and to ensure cost recovery, a minimum fee is proposed. Licensees will pay whichever is higher between the calculated fee and the minimum price.

In setting the minimum price, the following points were considered:

- Comparison to regional and international ranges
- Fees multiple of 12 for easy pro rata calculations

- The minimum fee was then set at R120 (a hundred and twenty South African Rand
- Whenever the application of the appropriate algorithm results in a license fee lower than R120 the minimum fee of R120 will be charged
- This minimum fee will be the fee applied to pre-assigned frequencies, such as all categories of Amateur Radio, Aeronautical as defined in the current regulations as well as certain land mobile stations.
- The Minimum Price is also the basis of charging for Maritime and Inmarsat stations
- *Therefore, the majority* of *Individual licensees will fall under the minimum licence*

7.4 Multi-year licenses

The process of renewing the licence fee and processing the annual fee is resource intensive and time consuming, especially for the smaller licence holders. In most cases the requirement to renew the licence fee on an annual basis is not strictly necessary and being able to get a licence for several years in advance would save time and money both for the ICASA and the licensees.

Therefore it is proposed that the option be given for licence fees to be paid for several years in advance with a discount scheme.

For most services, the multi-year licence can be up to 5 years. However, for users of pre-assigned frequencies where there is unlikely to be any change in frequency allocation, the multi-year licence fee can be up to 10 years.

The advantage for the Authority is a reduction in the workload. The advantages for licensees are:

- Securing the licence for several years and not having to undertake the time consuming process of renewal.
- Ability to enjoy a discount on existing prices.
- Not being subject, during the multi year licence period, to any price increases so that are imposed during the multi year licence period.

The table below shows the year and the multiplication factor that is applied to the annual licence fee to derive the total fee for the number of years. It is based on the present values at a discount rate of 10%.

Years	1	2	3	4	5
Factor	1	1.91	2.74	3.49	4.17

Example of the multi-year licence fee when applied to the minimum fees.

Years	1	2	3	4	5
Minimum Fee	R120	R229	R328	R418	R500

The multi-year license option is applicable where the demand or nature of services in a particular spectrum band indicates no risks associated with resources being locked by a single licensee for a long term. The multi-year licences can be applied in a number of ways:

- Allowing the licensees to make a choice between paying the licence fee for one year or a multi-year licence fee.
- Making it obligatory for the licensees in some services to purchase a multi-year licence fee.
- The Authority is minded to make it obligatory to pay a multi-year licence fee for various services, including, amongst others:
    - Amateur - at least 5 years
    - Aeronautical - at least 5 years.
    - Maritime - at least 5 years

Individual licensees of Land Mobile Services - who only pay the minimum licence fee – may also be required to obtain a 5 year licence. Other licensees are able to make a choice of between 1 and 5 years. The fees should be rounded to the nearest whole Rand.

7.5 Unit prices, Formulae and Derived Charges

The formulae are based on the multiplication of a unit price by a number of factors. The unit price is one dimension of freedom that the regulator can use to modify prices without changing the relative value within a class of services with the same unit price.

7.5.1 Unit Price

The Unit Price5 is a reference amount which is scaled by various factors to result in the actual price for the spectrum used by the licensee.

The unit price may be the same for all services or may differ between services. The unit price is analogous to being the base price per MHz paired.

The Authority proposes that the Unit price for all services subject to the following formulae to be set at R2 OOO for the current period.

7.5.2 Point-to- Area Formula

The following is the formula for point to area services. We recommend applying this formula for all point to area services except of aeronautical and maritime with exclusive band allocations:

Fee = (UNIT * FREQ * BW * CG * GEO * SHR * ASTER * UNIBI

The fee is the multiplication of the unit price (UNIT) by the frequency factor (FREQ), the bandwidth in MHz, the congestion factor (CG), the Geographic factor (GEO) the sharing factor (SHR), and the area sterilized factor (ASTER) and the un i-directional factor (UNIBI).

Worked Example

A licensee in Johannesburg deploys point-to-area system (repeater, tracking, alarm...) at 150 MHz. The requested bandwidth is 25 KHz= 0.025 MHz. Assuming that this particular band is congested (meaning there is a waiting list) in Johannesburg and that the requested coverage are is 1,256 km2 (or alternatively a radius of 20 Km), on an exclusive basis, the following applies using the factors as taken from the respective look up tables:

Unit Price = R2 OOO
Frequency factor FREQ = 1
Bandwidth factor BW: 0.025MHz
Congestion factor CG = 1.5 (on assumption that the 150 MHz band is congested in Jhb)
Geographical factor GEO = 1 (high density)
Sharing Factor SHR = 1 as the operator requires exclusive use of that frequency band in that area
ASTER = 56 for the applicable area in km2 or radius
UNIBI does not apply

The annual fee would then be: R2000*1*0.025*1.5*1*1*56 = R 4,200

In any calculation should the fee be less than the minimum fee of R 120, then the minimum fee of R 120 shall be paid.

7.5.3 Point-to- Point Formula

The point-to-point algorithm is to be applied to all fixed links whether below or above 1GHz. The formula is as follows:

Fee = (UNIT * FREQ * BW * CG * GEO * SHR * HOPMINI * UNIBI

The fee is the multiplication of the unit price (UNIT) by the frequency factor (FREQ),

the bandwidth (BW) in MHz, the congestion factor (CG), the Geographic factor (GEO), the sharing factor (SHR), the minimum hop length (HOPMINI) and the unidirectional factor (UNIBI).

Worked Example

A licensee operates a hop length of 8 km using 28 MHz of Bandwidth in the 5GHz band in a low density area. The following applies using the factors as taken from the respective look up tables.

Unit Price = R2,000

Frequency factor - FREQ = 0.3

Bandwidth factor BW = 28MHz

Congestion factor CG = 1.0 (no congestion)

Geographical factor GEO = 0.5 (low density)

Sharing Factor SHR = 1.0

HOPMINI = 1.414 - this is because the minimum hop length at 5 GHz is 16 km but the deployed hop length is 8 km therefore the premium is calculated as SQRT(16/8)=1.414 times the normal fee for the 5 GHz band.

UNIBI = 1

The annual fee = R2000 * 0.3 * 28 * 1 * 0.5 * 1 * 1.414 * 1 = R 11,877.

Should the calculated fee be less than the minimum fee of R 120, then the minimum fee of R 120 shall be paid.

7.5.4 Hub Ground Station Satellite Formula Hub

The ground station Fee = Max ($UL; UNIT* BW).

The fee is the multiplication of the unit price (UNIT) by the bandwidth (BW) in MHz, and $UL is the current minimum fee for satellite uplink connections (R 50,000).

7.5.5 Non-hub VSAT Ground Station Satellite Formula

Non-hub VSAT Fee = (UNIT * BW)

For VSATs which are a subordinate part of a system controlled by a hub station, the fee shall be determined as the multiplication of the unit price (UNIT) by the bandwidth (BW) in MHz - the standard rule regarding the Minimum fee applies.

7.6 Notes on Implementation

The Radio Frequency licence Fees will be reviewed from time to time and it is expected that they will be raised in line with inflation. Such a review should be made at least every 5 years. Any adjustment to the fees will be made to the Unit Price and the Minimum Fees.

7.6.1 Calculation and Payment

In order to simplify the process of calculation of the fees, all fees other than the fees for temporary usage will be calculated as for one year from the time of first payment and will be renewable on the applicable anniversary, either the first anniversary for a single year licence or (for example) the fifth anniversary for a five year multi-year licence.

7.6.2 Minimum Fees

The fees for pre-assigned frequencies, e.g. Amateur, Aeronautical and Maritime Ship Stations will be set at the minimum fee of R120.

7.6.3 Area Sterilized

For the point to area methodology, the key consideration is the area sterilized, i.e. denied to other users of the same spectrum. At present, for applications such as repeaters, the area of coverage. is often set at a radius of 50 km which however means that the area effectively sterilized is a radius of 100km or approximately 31,400 km2. This implies an ASTER factor of 180.

Licensees may choose to request a change to their assignment upon renewal of their licence.

7.6.4 Minimum Hop Links

The Minimum hop length factor is deployed to ensure that licensees utilize the optimum frequency for their hop length by applying a premium. If the hop-length is not known at the time of the fee adjustment, the HOPMINI factor will be set at 1.

7.6.5 Information

For the Radio Communications systems such as Alarms, Load Management, Vehicle Tracking, Radio Trunking and Repeaters, the existing fee structure is based on the minimum number of stations / equipment in any system. The new fee structure is now based on the radio spectrum used without explicit reference to the number of stations. Licensees will however be obliged to fulfil all requirements including the provision of all necessary information regarding the stations to the Authority and comply with any regulations or guidelines regarding the maximum number of stations in any given system.

7.7 Assignments

The new pricing system does not necessarily cause the Radio Frequency Spectrum more expensive, but it remains a scarce resource. Assignment of Radio Frequency Spectrum remains at the discretion of the Authority and applicants for an assignment of Radio Frequency Spectrum (including additional spectrum) should furnish all the information required by the Authority to support their application.