Consultation Paper

Guideline on Annual Variable Spectrum Fee ('T' & 'L' Factors)

Issued by NICTA, Port Moresby on 25 February 2011

1 Contents

2 INTRODUCTION

(a) Section 6 of the *NICT (Radio Spectrum) Regulation, 2010* (the "***Regulation***") prescribes the method of calculating the license fees for apparatus licenses and spectrum licenses issued on an administrative basis. For convenience, relevant parts of Section 6 are reproduced below:

> **6. FEES.**
>
> (1) The fees payable in respect of a spectrum licence –
>
> (*a*) issued on a market basis, may be structured to include –
>
> (i) an annual spectrum fee component to contribute to the maintenance of the spectrum allocated by the spectrum licence; and
>
> (ii) a price component set by the relevant allocation process payable annually or in a lump sum; and
>
> (*b*) issued on an administrative basis, shall be –
>
> (i) the non-refundable application fee set out in Schedule 4; and
>
> (ii) the annual variable spectrum fee calculated in accordance with the formula in Schedule 2.
>
> (2) For the purposes of Section 36(2)(ii) of the Act, the standard charges that would have been recovered by NICTA in respect of a spectrum licence if NICTA had followed its standard allocation process are as set out in Subsection (1)(*b*).
>
> (3) The fees payable in respect of an apparatus licence shall be –
>
> (*a*) the non-refundable application fee set out in Schedule 1; and
>
> (*b*) the annual fixed apparatus fee set out in Schedule 1; and
>
> (*c*) the annual variable spectrum fee calculated in accordance with the formula in Schedule 2.

(b) Spectrum Licence fees set on an administrative basis comprise a non-refundable application fee set out in Schedule 4 of the Regulation, plus an annual variable spectrum fee calculated in accordance with the formula in Schedule 2.

(c) Apparatus License fees comprise a non-refundable application fee and an annual fixed fee set out in Schedule 1 of the Regulation, plus an annual variable spectrum fee calculated in accordance with the formula in Schedule 2.

(d) The annual variable spectrum fee formula applies in both cases and is reproduced below:

ANNUAL VARIABLE SPECTRUM FEE
Annual variable spectrum fee payable = V x (2600÷F) x B x T x L
Notes to formula –
Standard baseline value (V) is the baseline value of 1 MHz of spectrum at 2,600 MHz and is prescribed to be K454 as at the Succession Date until 30 June 2011 and thereafter as adjusted annually on 1 July to reflect the change in the applicable Consumer Price Index for the preceding calendar year. The Minister, acting on advice from NICTA, may make a determination to adjust the value of V.
Frequency (F) is – (*a*) for frequencies below 30MHz, a value of 30; (*b*) for frequencies between 30MHz and 30,000MHz, the midpoint in MHz of the band in NICTA's frequency band plan in which the bandwidth sought to be licensed is located; and (*c*) for frequencies above 30,000MHz, a value of 30,000.
Bandwidth (B) is the total bandwidth in MHz the subject of the licence.
Type (T) represents the relative extent to which the service type licensed denies others access to spectrum being values as determined by NICTA in accordance with any guidelines issued under Section 6(7), having regard to the type of radiocommunications licence and the type of any station.
Location (L) represents the relative value of the geographic area in which apparatus or spectrum is to be used as determined by NICTA in accordance with any guidelines issued under Section 6(7), having regard to – (*a*) the population of the area; and (*b*) the nature of the economic activity in the area; and (*c*) the remoteness of the area; and (*d*) the level of radiocommunications congestion.

(e) While the values of the factors ***V***, ***F*** and ***B*** are prescribed in Regulations as shown above, NICTA is required to determine the values of ***T*** and ***L*** inaccordance with Guidelines that NICTA is required to issue under Section 6 (7) of the Regulations. The Guidelines are required to describe the rationale for, and set the values of the Type (***T***) and Location (***L***) factors. Before issuing Guidelines, NICTA is also required to follow the consultation process in developing Rules and Guidelines as set out in Sections 219 and 229 of the Act.

(f) The main purpose of this Consultation Paper is to explain the formula, and to show the rationale behind choosing values for ***T*** and ***L*** in particular circumstances.

(g) This Consultation Paper is aimed at fulfilling the requirements of the law in engaging with stakeholders and the general public in gauging views from the public on the values of ***T*** and ***L*** factors. The paper consists of the consulation paper and the Draft Guideline which contains the proposed values of the factors. Comments are invited from any inetersted persons. Comments open on the release of the Consultation paper and close on 25 February 2011

3 BACKGROUND

In order to show why it is necessary to apply fees for the use of radio spectrum some background information will be provided on the evolution of modern spectrum licensing.

3.1 Radio Spectrum Resources

(a) Radio spectrum is a natural resource that provides the medium for wireless communications services that are of great value to every nation. It has some properties that are unlike other natural resources in that it is fully sustainable because use of part of it today does not prevent use of the same part tomorrow. However, that current use does sometimes (but not always) prevent use of that same part by another person at the same time and place. Some spectrum use may cover an entire country while other uses may be confined to a particular area, enabling that spectrum be re-used in other areas at the same time.

(b) Although it cannot be totally consumed and lost forever, radio spectrum is a limited scarce resource in the sense that the range of available frequencies suitable for some service applications is limited. Technological developments are placing great demands on some bands, particularly in the areas of mobile telephony; broadband internet; broadcasting; wireless computing and, military applications. If not properly managed, spectrum users would take from the resource whatever they wish, thereby causing the high demand frequencies to be fully, but not necessarily efficiently utilised. Further, harmful interference would occur between services that were not properly frequency coordinated with each other. Clearly a resource regulator is required to avoid these problems by planning and rationing its use to avoid congestion.

3.2 Radio Spectrum Management

(a) As in most countries, the spectrum environment in PNG was initially managed by the Spectrum Management Department of the former Post and Telecommunications Corporation (PTC) who was the monopoly operator. In 1997 Post PNG, Telikom PNG and PANGTEL evolved from PTC which was dissolved and PANGTEL managed the Radio Spectrum Resources during a period of partial competition in telecommunications. In 2010, the *National Information and Communication Technology Act, 2009* (the "***Act***") established full competition in telecommunications with a new industry regulator, the National ICT Authority (NICTA) whose responsibilities include managing radio spectrum.

(b) In the same manner as for mineral or fishing resources, the radio spectrum resource belongs to the people of the country in which it is used, and it needs to be managed in the best interest of the people. Governments are therefore required to ensure that the people receive appropriate financial return for the use of the resource, and also that they receive the full range of beneficial services that may be provided through the use of the spectrum. In PNG this is to be achieved by NICTA through the Act.

3.3 Spectrum Allocation Methods

3.3.1 Administrative Spectrum Allocation

(a) By controlling who has access to which portions of the radio spectrum, and in which parts of the country, the spectrum regulator can plan for the resource to be used in the manner that is most efficient and beneficial for the economy and consumers. Performing this spectrum assignment function well requires considerable technical competence because an understanding of the physics of radio wave propagation and the spectrum requirements of all forms of radio technology is required. Spectrum management has become a specialised field of engineering, but one which due to the small number of practitioners is not taught in many engineering schools.

(b) The costs of maintaining the licence regime which are the operating costs of the regulator are considerable, and normally the government will require that these are at least covered by revenue from all the licence fees. In addition, the regulator is usually given the power to use the licence fees as a rationing mechanism, so that requests will not be made for trivial usage that denies other uses that would provide valuable services. The process in which the spectrum regulator makes all the decisions about spectrum usage and licence fees is known as "Administrative Spectrum Allocation". This is the original method and it remains today the most common model used around the world. While market methods may produce better results for some competitive commercial situations, the old Administrative method remains the only practical system for assigning spectrum for most applications. This paper is primarily about licence fee setting under the Administrative system, but before discussing that in detail, it is useful to outline briefly the alternative spectrum allocation methods.

3.3.2 Market Based Spectrum Allocation

(a) In recent years, the licence price has become regarded as a useful means of determining which applicant should receive a licence when there is not sufficient suitable spectrum for all applicants to be satisfied. Economists believe that the person who has the most valuable application to the economy will be able to make the most profit from it, and so will be able to pay the highest licence fee. The hope is that by requiring competing users to bid for the spectrum, it will automatically go to the top bidder who has the highest value application. However, in practice this is not always the case.

(b) Market based Allocations should only be used where there is an excess of commercial demand for a limited spectrum resource that can be used for providing profitable services.

3.3.3 The Spectrum Commons Allocation

(a) Both the Administrative and Price-based frequency assignment paradigms have proven to be inadequate for allocations to some types of applications. Usually, this happens where large numbers of relatively inexpensive wireless devices, having a low potential for harmful interference, need to be used in any location by any person. This is known as "*Ubiquitous Use*", and examples include: CB Radio; household Wi-Fi networking; and remote controls for things such as garage or car doors. In these cases the Administrative method would delay access to the spectrum and impose a huge workload on the regulator and the need for a licence would

discourage consumer use of facilities that could lead to valuable economic growth. The Price-based method is not appropriate because there is no entity that would have any incentive to purchase a licence for the ubiquitous users.

(b) In PNG spectrum provided for such applications; together with the conditions of use, constitute what is known as a "Class Licence". No licence fee or registration is required and [no protection is given by the regulator.] Any usage that does not comply with the conditions of the class licence is automatically unlicensed, and such users can be prosecuted.

3.3.4 The Special Case of Satellites

(a) Satellites use spectrum in a very different manner than terrestrial services do. This is so much the case that often services can be delivered by both satellite and terrestrial technology on the same band. Special licensing treatment is required for satellite services to reflect their different spectrum denial and coverage characteristics. Depending on the number of earth stations served by a network, two options are possible. When the number of earth stations are few apparatus licences to the space station and each earth station may be issued for the spectrum each station uses (administrative approach). When the number of earth stations are numerous a spectrum license on the administrative approach can be adapted to licensing satellites through the use of a space station licence for all spectrums used in the coverage area and for the earth stations, they can be covered under a satellite terminal class licence.

(b) There are three broad network configurations used for the delivery of satellite services:

1. The first type is Fixed Satellite Service (FSS) where telecommunications services are distributed from a network hub at a major city Earth station via satellite transponders to distributed Earth Stations in various parts of the country. An example would be in the telecommunications network of a major carrier where a major city earth station connects the telephone network to VSATs located in various towns that cannot be easily reached by terrestrial links.

2. The second type is Broadcasting Satellite Service (BSS) where a service is distributed directly to homes (DTH) and businesses via a satellite. An example would be in subscription or free television broadcasting where viewers have a small dish for receiving the service on their roof.

3. The third type is Mobile Satellite Services (MSS), in which satellites are used to communicate directly to and from mobile terminals. Current examples include Iridium and Inmarsat phone and data terminals. Future generation cellular mobile phones are expected to include a MSS option on some terminals.

(c) For the first service type the Administrative licensing model can work quite well when the number of Earth Stations are few, with each Earth Station being apparatus licensed, frequency coordinated and protected in the much same manner as a FS terrestrial link. This model however, may be impractical when a large number of VSATs is used with bandwidth that may change at any time. In this case it may be more practical to issue space station licence and a class licence for the associated VSAT stations.

(d) For the direct to home service type the same Administrative licensing model as for FSS could be an option if the number of earth stations are relatively few. However, in the case of receive-only DTH broadcasting services, Administrative licensing is usually impractical because of the large number of privately owned terminals which could be located anywhere. The tasks of frequency coordination, licensing, interference protection and enforcement would place an exceptional burden on the regulator. Currently the legislation requires satellite television receivers to be licensed however NICTA may issue a class licence.

(e) In the case of mobile satellite services, the terminals may be even more ubiquitous than for DTH BSS, as they transmit as well as receive. Currently handheld/mobile earth stations require licensing and this could create a massive licensing problem for both the regulator and the operator, but it can be avoided by a combination of space station and class licences.

1. In the case of ubiquitous terminals the satellite operator may take out a space station licence covering the use of his transponder bandwidth across the entire country. The fee for this licence accounts fully for the use of this large volume of spectrum over a wide area. This requirement can be handled in two ways: Through the use of a satellite terminals class licence which includes the space station spectrum; or

2. Through a third party authorisation by the carrier that has licensed the space station spectrum. The contract which the carrier has with each subscriber can include a clause giving a formal third party authorisation (provided for in the NICTA Act) to use this spectrum only for communications permitted under the contract, and using approved equipment

4 The Annual Variable Spectrum Fee Formulae

4.1 Objectives for the Radio Licence Fees Formula

(a) The Annual Variable Spectrum Fee is intended to be:

1. Consistent as much as possible with previous prices paid for similar spectrum, taking into account regulatory costs;

2. Inversely proportional to frequency because of the greater bandwidth available in the higher frequency bands and their inferior propagation characteristics;

3. Proportional to the frequency span or bandwidth to be licensed;

4. Proportional to the extent of denial of access to the same spectrum to other potential users; and

5. Proportional to the coverage area taking into account the demographics of that area in terms of population, economic activity, purchasing power and the level of congestion;

(b) Each of the above objectives is achieved by a parameter in the formula as shown below.

4.2 The Parameters in the Fees Formula

4.2.1 Baseline Value ("V")

(a) Objective 1 is achieved through ***V*** (in Kina/MHz) which is the Standard Baseline Value of 1MHz bandwidth at 2,600 MHz (also known as reference unit bandwidth fee). The initial value of ***V*** is prescribed at 454 K/MHz. After 30 June 2011, the value of ***V*** will be adjusted annually to reflect the CPI of the previous year, and the Minister may make a determination to adjust ***V*** consistent with Objective 1.

(b) This figure reflects licence fees paid since 1994 during periods of monopoly or partial competition when few operators were licensed and spectrum was not as valuable because of limited demand. The licenses were issued for a specific service and could not be used for any other purpose. They had no market value as they lacked tradability and technology neutrality. A Spectrum Licence issued on a market basis will be more valuable as it will have these features. If the market is not used to set the price, it will be necessary to administratively set the price consistent with its estimated market value. Therefore, prices for scarce spectrum will inevitably be higher during competition.

4.2.2 Frequency ("F")

Objective 2 is achieved by division by ***F*** (in MHz). For frequencies between 30MHz and 30GHz, ***F*** is the centre frequency of the band. The constant of 2600 is the normalizing factor since the reference frequency for ***V*** is 2600 MHz.

4.2.3 Bandwidth ("B")

This factor is the bandwidth (in MHz) to be licensed. It is equal to the lowest frequency subtracted from the highest frequency in a continuous band of spectrum. This factor achieves Objective 3 of the formula.

4.2.4 Type of Service Factor ("T")

The ***T*** factor is used to achieve Objective 4. In practice, a licence may deny access to the same spectrum in the same location to a number of other applications. The ***T*** factor is related to the type of licence or type of apparatus of the subject licence, but also to the transmitter power that determine the geographic coverage.

4.2.4.1 Value of *T* for Apparatus Licences

Fixed and Mobile Services

(a) Most fixed and mobile services use low transmit power and ***T*** is not dependent on power. The value of ***T*** = 1 is chosen as the reference value attributed to a fixed point to point link. Due to

the directivity of links the same channel it may be possible for the same channel to be re used in the same location. The number of times the channel may be reused depends on frequency, type of equipment, terrain etc. However with a point to multi point link reuse of the channel in the same location is more difficult or not possible. For simplicity it has been adopted over the past years that a point to multi point link denies spectrum re use 4 times more than a point to point link. This will continue and therefore the value of ***T*** = 4 has been set for point to point links. Similarly, a corporate licence for a system comprising one repeater and several mobile and handheld stations denies the reuse of the same channel in the same area. However a handheld or mobile station would allow the same channel to be shared by others thus are attributed lower ***T*** values.

Broadcasting Services

(b) Broadcasting services use a range of transmit powers which affects the value of ***T*** accordingly. High power transmitters pose greater denial and therefore ***T*** = 4 is the maximum for high power transmitters and decreases with lower power.

Spectrum Licences issued on Administrative Basis

(c) A spectrum licence denies the use of the same spectrum by others in the same area and has therefore the maximum denial ***T*** = 4 irrespective of the technology or type of apparatus used.

(d) The concept of spectrum licence may also be applied to satellite services serving ubiquitous terminals. A space station may cover the entire country, although the spectrum can sometimes be shared with certain types of terrestrial services. A value of ***T***=4 is deemed to be appropriate in situations where the spectrum isnot shared in PNG. If there is sharing this figure could be reduced in proportion. If the entire spectrum is shared by many terrestrial services, a figure of ***T*** = 2 would be appropriate.

4.2.5 Location Factor ("L")

(a) *Location **(L)** represents the relative value of the geographic area in which apparatus or spectrum is to be used as determined by NICTA in accordance with any guidelines issued under Section 6(7), having regard to:*

1. *the population of the area;*
2. *the nature of the economic activity in the area;*
3. *the remoteness of the area;*
4. *the level of radiocommunications congestion.*

(b) Some radio licences will be much more valuable than others because of the location where they permit transmission. For example, a land mobile VHF repeater in a remote area would be worth much less than a licence for the same facilities on a hill in Port Moresby. If profitable consumer services are to be provided through the licensed radio facility, the population in the coverage area and the state of the local economy will have a large impact on the value of the licence.

4.2.6 The arbitrary Nature of *T* and *L*

(a) Under ideal circumstances it would be useful to conduct a detailed study of the spectrum denial and location factors involved in each licence application in order to derive values for ***T*** and ***L*** that accurately reflect the particular situation involved with each spectrum access. However, this would require the dedication of expensive engineering and economics resources within NICTA and would greatly add to the administrative cost of licensing.

(b) A compromise has been reached in which a relatively few particular values of ***T*** and ***L*** can be applied to the licence formula based on a cursory examination of the licence application by administrative staff in the manner described in 4.2.4 and 4.2.5. While this approach is open for discussion in this consultation process, it is not intended to open debate on a more rigorous technical method, which would need to be applied to each licence application.

4.2.7 *L* for Apparatus Licences

Major Centres are ascribed the maximum value ***L*** = 1. The value of ***L*** is reduced for less populated locations where there is less economic activity and potential for congestion.

4.2.8 Spectrum Licences issued on Administrative Basis

For spectrum licences issued on administrative basis the coverage area will usually include more than one location. The value of ***L*** therefore should reflect the aggregate ***L*** values covered by the spectrum licence. For nation-wide licenses ***L*** = 9 and decreases for smaller coverage areas.

4.2.9 *L* for Space Station Licences

(a) Since the satellite services usually cover the entire country a choice of ***L*** = 9 is appropriate for the same reasons as for spectrum licences. This figure might be reduced in proportion if the satellite footprint covers only part of the country with usable signal strength.

(b) The Bandwidth applied to the licence is the total frequency range of all the transponders that are providing services within PNG. Other spectrum used by the satellite due to footprints, which cover PNG, but are not being used to provide services there are irrelevant. There may be significant spectrum denial caused to PNG from satellite footprints that illuminate PNG unnecessarily, but that is a matter that should be addressed through the satellite notification and coordination process rather than through domestic licensing.

5 WRITTEN SUBMISSIONS ON CONSULTATION PAPERS

*(a) NICTA is seeking comments from PNG industry members, prospective licensees, and consumers regarding a methodology for deriving suitable **T** and **L** values for various locations and types of radio communications services. Comments received will be published (on the web site) and considered before NICTA derives the initial values of **T** and **L**. Comments on comments submitted by others arriving before the submission deadline will also be considered*.

(b) Formal written comments should be submitted to NICTA by March 25, 2011 addressed to:

Director Regulatory & External Affairs
NICTA
PO Box 8227
Boroko
National Capital District

(c) All formal written submissions will be published on the Public Register in accordance with Section 229 (3) of the NICT Act 2009. Any persons making submissions to this public consultation should request exclusion of information deemed confidential in accordance with Section 44(1) of the NICT Act 2009 where necessary.

Guideline on Annual Variable Spectrum Fee (‘*T*’ & ‘*L*’ Factors)

-Insert Guideline Number-

This guideline is issued by the National Information & Communication Technology Authority (NICTA) Pursuant to Section 6(7) of the *National Information & Communication Technology (Radio Spectrum) Regulation, 2010* (the “***Radio Spectrum Regulation***”).

1. INTRODUCTION

NICTA is Papua New Guinea’s regulator for Telecommunications, radiocommunications, Internet and broadcasting. As the radio spectrum manager, NICTA allocates access to the radio frequency spectrum though one of three types of licence; Spectrum License, Apparatus Licenses or Class Licenses. The Radio Spectrum Regulation prescribes the method of calculating annual license fees for Apparatus Licences and Spectrum Licences issued on administrative basis. The fees are calculated in accordance with a formula set out in Schedule 2 taking into account relevant parameters and factors of the particular licence.

This guideline is issued by NICTA Pursuant to Section 6(7) of the Radio Spectrum Regulation. The guideline describes the rational for and sets the values for the Type of Service Factor (***T***) and the Location Factor (***L***).

2. SPECTRUM FORMULA

The Annual Variable Spectrum Fee Formula is set out in Schedule 2 of the Radio Spectrum Regulations and reproduced below.

Annual Variable Spectrum Fee (AVSF) = V x 2600/F x B x T x L

Where ‘***V***’ is 454, ‘***F***’ is the Frequency, ‘***B***’ is the frequency bandwidth (in MHz), ‘***T***’ is the type of service Factor and ‘***L***’ is the location factor.

3. VALUES OF “*L*” and “*T*” FOR APPARATUS LICENSES [Section 6(3) (c)]

3.1 Location Factor (“*L*”)

Major Centres are ascribed the maximum value ***L*** = 1. The value of ***L*** is reduced for less populated locations where there is less economic activity and potential for congestion. The values of ***L*** are independent of type of apparatus and have the same ranges as shown in the tables below.

3.2 Type of Service Factor ("*T*")

Most fixed and mobile services use low transmit power and ***T*** is not dependent on power. The value of ***T*** = 1 is chosen as the reference value attributed to a fixed point to point link. Due to the directivity of links the same channel may be used at least 4 times in the same location. However with a point to multi point link reuse in the same location is not possible. Since a point to multi point link denies spectrum re use 4 times more than a point to point link the value of ***T*** = 4. Similarly, a corporate licence for a system comprising one repeater and several mobile and handheld stations denies the reuse of the same channel in the same area. However a handheld or mobile station would allow the same channel to be shared by others thus are attributed lower ***T*** values. The Values of ***T*** for various types of apparatus and services are shown in Table 1a, 1b, 1c.

Table 1a: *Values of **T** & **L** Factors for Apparatus licenses excluding Satellite and Broadcast stations*

Service Type	Apparatus type	T
Fixed	Point to Point Station	1.00
	Point to Multipoint Station	4.00
	Cellular Base Station	4.00
	ISM Point to Point	0.00
	ISM Point to Multipoint	0.00
Mobile	Corporate Station	4.00
	Cellular Base Station	4.00
	Repeater Station	1.00
	Base Station	1.00
	Aeronautical Station	1.00
	Coast Station	1.00
	Limited Coast Station	1.00
	Mobile Station	0.10
	Handheld Station	0.10
	Ship Station	0.10
	Aircraft Station	0.10
Amateur	Amateur Station	0.10
Radio Determination	Radio Location	4.00
	Radio Navigation	4.00
Meteorological	Meteorological Station	4.00

Locality	L
Major Towns	1.00
Minor Towns	0.60
Rural/Remote	0.30

EXAMPLE ONLY

Service Type	Apparatus	Fixed K	Band	Band Limits MHz	MHz	F MHz	B MHz	T	L	AVLF K
Fixed	Point to Point	1000	7 GHz	7425	7725	7575	14	1	1	2182
	Point to MP	1100	1.5 GHz	1428	1524	1476	2	4	1	6398
Mobile	Corporate(V)	700	VHF High	148	174	161	0.05	4	1	1466

Broadcasting services use a range of transmit power, which affects the value of ***T***, accordingly. High power transmitters pose greater denial and therefore ***T*** = 4 is the maximum for high power transmitters and decreases with lower power.

Table 1b: *Values of **T** & **L** Factors for Broadcast Apparatus*

Service Type	Apparatus Type	Power Levels	T
Broadcasting	VHF TV	>2-10kW	4.00
		>1-2kW	0.80
		≤ 1kW	0.40
	UHF TV	200-1000W	0.40
		100-200W	0.08
		< 100W	0.04
	MMDS	2-10W	4.00
		1-2W	0.80
		< 1W	0.40
	FM Sound	100-500W	4.00
		50-100W	0.80
		< 50W	0.40
	AM Sound		4.00
	Satellite		4.00

Locality	L
Major Towns	1.00
Minor Towns	0.60
Rural/Remote	0.30
Nationwide	9.00

EXAMPLE ONLY

Band	Band Limits		F	B	T	L	AVLF
	MHz	MHz	MHz	MHz			K
HF B/c	0.03	30	30	0.003	4	1	472
FM Sound (<100W, Remote)	88	108	98	0.2	0.8	0.3	578

Table 1c: *Values of **T** & **L** Factors for Satellite Apparatus*

Service Type	Apparatus type	T
Satellite Earth stations	Fixed Earth Station	0 or 4
Satellite Earth station Handheld	Mobile/Handheld Earth Station	0 or 0.1
Earth Station Receive Only	Earth Station Receive Only	0.00
Space Station		4.00

Locality	L
Major Towns	1.00
Minor Towns	1.00
Rural/Remote	1.00
Nationwide	3

EXAMPLE ONLY

Band			F	B	T	L	AVLF
	MHz	MHz	MHz	MHz			K
ES Fixed (C-Band)	3700	6425	5063	1	4	1	933
ES Fixed (C-Band)	3700	6425	5063	0.5	4	1	466
ES Fixed (Ku-Band)	11700	14300	13000	2	4	1	726
ES Fixed (Ku-Band)	11700	14300	13000	1	4	1	363

4. VALUES OF "*L*" and "*T*" FOR SPECTRUM LICENSES

4.1 Type of Service Factor ("*L*")

For spectrum licences issued on administrative basis the coverage area will usually include more than one location. The value of ***L*** therefore should reflect the aggregate ***L*** values of all the locations covered by the spectrum licence taking into account the administrative cost savings made by issuing and administering a single license as opposed to multiple apparatus licenses. For nationwide licenses ***L*** = 9 and decreases for smaller coverage areas.

4.2 Type of Service Factor ("*T*")

A spectrum licence denies the use of the same spectrum by others in the same area and has therefore the maximum denial ***T*** = 4 irrespective of the technology or type of apparatus used.

Table 2: *Values of **T** & **L** Factors for Calculation of Fees for Spectrum licenses issued under Administrative Basis*

Service Type	Apparatus Type	T
Any	Any	4.00

Locality	L
Major Town	3.00
Minor Town	2.00
Rural/Remote	1.00
Nationwide	9.00

FOR EXAMPLE ONLY:

Band	Band Limits		F	B	T	L	AVLF
	MHz	MHz	MHz	MHz			K
850 - CDMA	800	880	840	22	4	7	865627
GSM - 900	880	960	920	26.667	4	7	958006
GSM - 1800	1710	1880	1795	20	4	7	368258

5. CATEGORIES OF LOCATIONS

The locations used for the ***L*** factor are divided into three categories and are shown in the table below.

Category	Location
Major Towns	Port Moresby Lae Mt. Hagen
Minor Town	All other provincial capitals excluding the ones mentioned above
Rural/Remote	All other locations not specified above

The towns included in each category may change based on input from the relevant Government agencies.