ESWATINI COMMUNICATIONS COMMISSION

10 Years Regulating ICT in Eswatini

GENERAL NOTICE NO. 2/2024

PROPOSED DECISION IN TERMS OF SECTION 32 OF THE SWAZILAND COMMUNICATIONS COMMISSION ACT, 2013: REVISED SPECTRUM PRICING FRAMEWORK 2024 FOR CONSULTATION - INVITATION FOR WRITTEN REPRESENTATIONS.

The Eswatini Communications Commission (ESCCOM), hereinafter referred to as the Commission, is in the process of reviewing the framework for fees for the use of radio frequency spectrum in Eswatini in accordance with Section 34 of the Electronic Communications Act, 2013 and authorized by Regulation 16 of the Electronic Communications (Radio Communications and Frequency Spectrum) Regulations, 2016. The current framework was developed in 2021 and the legislative provisions require that the spectrum pricing framework be revised at least once every three (3) years.

The provisions of Section 32 of the ESCCOM Act, 2013, allow for stakeholders and interested persons to make comments on proposed decisions of the Commission, therefore the public is hereby invited to submit their written presentations on the proposed decision on the revision Spectrum pricing framework, published herewith by the Commission.

A copy of the proposed Decision document is available on the Commission's website at www.esccom.org.sz. Written representations with regard to the proposed Decision must be submitted to the Commission no later than 17h00 on 7 March 2024, electronically to info@esccom.org.sz.

Chief Executive
Eswatini Communications Commission

ESWATINI COMMUNICATIONS COMMISSION

GENERAL NOTICE NO. 2/2024

Spectrum Fee Schedule for Consultation

Date: January 2024

Contents

1 Introduction

1.1 Background

The Eswatini Communications Commission ('the Commission') developed a new Spectrum pricing framework (Formula) which resulted in the Commission publishing a Spectrum Fee Schedule 2018, in terms of section 17 of the Electronic Communications (Radio Communications and Frequency Spectrum) Regulations 2016) ('the Spectrum Regulations'). The schedule was developed in such a way that it would be forward looking and be technology neutral so that future reviews would be easily implemented by changing only specific factors, taking into consideration the current trends and best practices. Consequently, the pricing framework was reviewed by the Commission in 2020.

In accordance with the Spectrum Regulations, *(3) The Commission shall review and publish the pricing formula for frequency spectrum at least once in every three (3) years,* therefore the Commission has again initiated a process to review the Spectrum pricing formula in order to publish a new schedule. The main focus of this schedule is to promote the efficient use of radio frequency spectrum.

17. (1) The Commission shall adopt a pricing formula that reflects the economic value of frequency spectrum in order to encourage efficient use of frequency spectrum and stimulate growth.

(2) The pricing formula adopted under sub-regulation (1) shall consider the-

(a) size of spectrum assigned;

(b) frequency band and level of congestion within the band;

(c) market demand;

(d) power output;

(e) geographical usage; and

(f) such other factors as the Commission may from time to time determine.

(3) The Commission shall review and publish the pricing formula for frequency spectrum at least once in every three (3) years.

1.2 Intention of the Commission

The Commission is seeking continuity in the spectrum pricing which will still maintain the basic requirements such as:

- 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.
- Reflects the relative economic value of spectrum

- Be forward looking, technologically neutral and sustainable.
- Be user friendly and easy to implement.
- Be flexible and be tuneable to meet alternative spectrum fee revenue objectives.
- Stimulate economic growth.
- Be appropriate for Eswatini conditions and ESCCOM resources.

The new Spectrum pricing formula and Spectrum fee schedule seeks to emphasize the importance of the efficient use of Spectrum, by the following:

- Rewarding Spectrum users who employ initiatives to efficiently use Spectrum assigned to them.
- Penalizing Spectrum users who use Spectrum inefficiently.

Furthermore, this new pricing framework:

- Considers the developments in the Satellite service where there is the Non GSO networks which have increased in number of installations requiring or accommodating the blanket licensing of Satellite terminals.
- Consider the actual coverage of Land Mobile service networks in the formulation of the Spectrum pricing.

1.3 Overview of changes to be implemented.

The new pricing framework will in general implement the following with respect to the current Spectrum Pricing Framework:

- ❖ The Unit price shall remain the same for the next three years, but the framework will provide for the implementation of specific conditions which the Commission may specify from time to time.
- ❖ All factors used for calculation of Spectrum pricing shall remain unchanged for the next three years, with only the addition of the Discount factor.
- ❖ The use of one channel in the vertical and horizontal polarization configuration to increase capacity of links shall be counted as one as this is an effort in efficient use of Spectrum.
- ❖ The Hopmini factor shall be implemented on all point-to-point links.
- ❖ Pricing for satellite terminals shall be based on blanket licensing, which considers the number of terminals that have been installed, giving a discounted price for many devices and as such the formulae shall be modified to cater for this.
- ❖ Pricing for PMR shall be based on the predicted actual coverage of a particular network as opposed to the usage coverage area.

2 Technical Evaluation and computation of fees

The proposed model still maintains an administrative pricing model with incentives to promote the efficient use of spectrum and national development. The proposed model charges licensees for the spectrum they use, incentivises them to only use the spectrum they need and to use such spectrum efficiently. It is also intuitively fair to all users, especially as a

uniform Unit Price is charged. The model is structured in such a way that it allows for technology and service neutrality, and it also allows for spectrum users to work on different parameters in order to manage their operational costs. It also allows for initiatives such as spectrum refarming without additional cost which are essential in the development of technologies.

The model maintains the four formulae with modified factors for Satellite Services as follows:

Point to Area Formula

Fee = (UNIT * FREQ-M * BW * HD * SHR * AF)

Point to Point Formula

Fee = (UNIT * FREQ-F * BW *HD * SHR * HOPMINI)

Hub Ground Station Satellite Formula
Hub ground station Fee = Max ($\$_{UL}$; UNIT * BW_{UL})

Non-hub User Terminal (CPE) Ground Station Satellite Formula
Non-hub CPE Fee = Number of Terminals***DF***Max ($\$_{CPE}$; UNIT * BW_{UL})

The factors used in in the model are as follows:

UNIT	Unit Price per MHz of assigned spectrum
BW	Bandwidth in MHz being the total unpaired assigned bandwidth
FREQ-F	Frequency factor that is based on the propagation characteristics of the frequency locations meaning that higher frequencies cost less than lower frequencies, applicable for Terrestrial Fixed services
FREQ-M	Frequency factor that is based on the propagation characteristics of the frequency locations meaning that higher frequencies cost less than lower frequencies, applicable for Terrestrial Mobile services
HD	High Demand Factor set by the Commission for spectrum in High Demand which may include spectrum subject to congestion
SHR	Sharing factor that gives a discount of 50% to licensees who are prepared to share spectrum
AF	Area Factor that reflects the land area covered by a point to area assignment based on the radial distance that corresponds to the area in square kilometres
HOPMINI	Minimum Hop Length, which will be applied to point-to-point links and penalises licensees who make undue use of low frequency bands for links with relatively short hop lengths
BW_{UL}	The bandwidth of the uplink connection
$\$_{UL}$	The current minimum fee for Hub satellite ground station uplink connections
$\$_{CPE}$	The current minimum fee for non- hub satellite ground station uplink connections
DF	Discount Factor is calculated based on the number of devices installed. Only applicable for Satellite user terminals or CPEs

3 The Unit Price

The unit price is equal to the equivalent value of 1MHz of Spectrum being issued to communications service providers. The Commission has reviewed this figure and determined that there will be no increments to the unit price for the next three-year period. This effectively means that the Unit Price will remain at the set value of **SZL 2,164.00** for the next three-year period.

4 The Implementation of the Hopmini Factor

The Hopmini factor is a tool designed to promote efficient spectrum usage within the fixed link service by encouraging the use of higher frequency bands for short hops, and lower frequency bands for long hops. This tool achieves this by prescribing the minimum path length per band for all the available frequency bands in the fixed link service. If the path length is equal or greater than the minimum path length then the Hopmini factor will be 1, if the path length is less than the minimum path length then the Hopmini factor will be calculated as

$$Hopmini = \sqrt{\frac{Minimum\ Path\ length\ for\ the\ \ Frequency}{Actual\ Path\ length}}$$

The minimum path lengths are prescribed in the table below:

Table 1. Minimum Path Lengths

Frequency Band [GHz]	Min Path Length [km]
0.4	100
0.8	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 & higher	1

The HOPMINI factor is not a new tool, but a tool that was not implemented in the last two cycles after the stakeholder consultation process. The Commission is now implementing this tool in line with its objectives of promoting efficient spectrum use.

5 Vertical and Horizontal Polarization Considerations

In the fixed link service, there are dual polarized antennas that have the capability of utilizing the same frequency for two different links. The antenna achieves this by employing a dual polarization technique where one link is horizontally polarized and the other link is vertically polarized. This is an efficient use of the RF Spectrum and links that employ this technology will be treated as one link benefiting the users of such technologies.

6 Blanket Licensing for Satellite Services

A blanket licensing approach will be implemented for non-hub satellite services. In this new scheme one license will cover multiple satellite terminals, elimination the need for operators to have separate licenses for each installation. Under this new method an operator/licensee will apply for a license based on the total number of stations/equipment that they plan to add (or have) in a specified period e.g.,5 to 10 years. A license is then issued for that period and the licensee updates the Commission annually on the total number of stations added on their network.

Secondly, a discount factor has been added to the pricing for satellite operators who have a lot of stations. The factor will be applied as follows;

(a) If a satellite operator has less than 51 terminals, they pay the same fee as they would pay for a single equipment.

(b) If a satellite operator registers a larger number of equipment/terminals than the initially stated number of terminals (more than 50 terminals), the total fee will be decreased by a certain factor (discount factor as shown below) and the calculations shall be as outlined below.

Number of equipment/terminals (Y)	Discount factor
1 to 50	1 (no discount)
51 to 200	0.96
201 to 500	0.92
Above 500	0.88

The reduced fee will be calculated as follows:

Reduced fee = Total fee for a single equipment * Discount Factor (DF)

The New Schedule

Spectrum Fee Schedule 2024

The Eswatini Communications Commission ('the Commission') hereby publishes a revised Spectrum Fee Schedule, in terms of section 17 of the Electronic Communications (Radio Communications and Frequency Spectrum Regulations 2016) ('the Spectrum Regulations') which thereby, with effect from 1st April 2024 repeals the spectrum fee schedule 2021 for radio frequency spectrum license fees.

1. Definitions

In this Schedule, unless the context otherwise requires –

$$_{UL}$$	means the minimum fee for satellite uplink connections
$$_{CPE}$$	The current minimum fee for non- hub satellite ground station uplink connections
Act	means the Electronic Communications Act, 2013
AF	means Area Factor
Area Factor	means a factor that is applied to reflect an area that is denied to other users of a frequency assignment
Amateur	means a person who is interested in the radio technique solely for a private reason and not for financial gain and to whom the Commission has granted an amateur radio station licence and shall mean a natural person and shall not include a juristic person or an association: provided that an amateur radio station licence may be issued to a licensed radio amateur acting on behalf of a duly founded amateur radio association
Assignment	means the authorisation given by the Commission to a licensee to use a radio frequency or radio frequency channel under specified conditions
BW_{UL}	means the uplink bandwidth in MHz
BW	means Bandwidth Factor
Bandwidth Factor	means the total unpaired bandwidth assigned to a licensee in MHz
Discount Factor (DF)	Means a factor used to discount the price for satellite CPE terminals calculated based on the number of licensed or installed devices.
EHF	means Extremely High Frequency
FDD	means Frequency Division Duplex
FREQ-F	means Frequency band Factor for Fixed services
FREQ-M	means Frequency band Factor for Mobile services
Frequency band Factor	means a factor that is based on the propagation characteristics of the frequency locations meaning that higher frequencies cost less than lower frequencies.

GHz	means Gigahertz of Radio Frequency Spectrum;
HD	means High Demand factor
High Demand Factor	means factor set by the commission for spectrum that is considered to be in high demand, which may include spectrum subject to congestion
HOPMINI	means minimum hop length factor
Minimum Hop Length Factor	means factor which will be applied to point to point links and penalises licensees who make undue use of low frequency bands for links with relatively short hop lengths
kHz	means Kilohertz of radio frequency spectrum
Land mobile service	means a mobile radio-communication service between fixed stations and mobile land stations, or between land mobile stations
LF	means Low Frequency
LMR	means Land Mobile Radio
MHz	means Megahertz of radio frequency spectrum;
Minimum Fee	means the minimum fee paid for a radio frequency spectrum licence
PMR	means private mobile radio
PtM	means Point to Multipoint
PtP	means Point to Point
SHF	means Super High Frequency
SHR	means Sharing Factor
Sharing Factor	means factor that affords a discount for the sharing of spectrum
TDD	means Time Division Duplex
UNIT	means unit price
UHF	means Ultra High Frequency
UL	Uplink
VHF	means Very High Frequency
VLF	Very Low Frequency
VSAT	means Very Small Aperture Terminal and is a two-way satellite ground station that is smaller than 3 metres in diameter

2. Intentions of the Commission

(a) The intention of the Commission is to publish a revised system of spectrum fees that are in line with the Spectrum Regulations and meet the following criteria:

i. Promote efficient use of spectrum.

ii. Prevent stockpiling of spectrum.

iii. Provide incentives to move to less congested spectrum.

iv. Provide incentives to hand back spectrum that is not needed.

v. Encourage users to switch to spectrally efficient technologies.

vi. Reflects the relative economic value of spectrum.

vii. Be forward looking, technologically neutral and sustainable.

viii. Be user friendly and easy to implement.

ix. Be flexible and be tuneable to meet alternative spectrum fee revenue objectives.

x. Stimulate economic growth.

xi. Be appropriate for Eswatini conditions and ESCCOM resources.

xii. The new Spectrum pricing formula and Spectrum fee schedule seeks to emphasize the importance of the efficient use of Spectrum, by the following:

a. Rewarding Spectrum users who employ initiatives to efficiently use Spectrum assigned to them.

b. Penalizing Spectrum users who use Spectrum inefficiently.

xiii. Furthermore, this new pricing framework:

a. Considers the developments in the Satellite service where there is the Non GSO networks which have increased in number of installations requiring or accommodating the blanket licensing of Satellite terminals.

b. Consider the actual coverage of Land Mobile service networks in the formulation of the Spectrum pricing.

3. Pricing Approach

(a) The Commission shall adopt a pricing formula that reflects the relative economic value of radio frequency spectrum in order to:

i. encourage the efficient usage of radio frequency spectrum and stimulate growth.

ii. Discourage hoarding of Spectrum

iii. To provide transparency in Spectrum pricing

(b) The price of radio frequency spectrum shall be directly proportional to the size of radio frequency spectrum assigned.

(c) The price of radio frequency spectrum shall vary depending on the frequency band.

(d) The price of the radio frequency spectrum may also reflect all or some of the following factors:

i. the area sterilised (denied to other users),

ii. the propagation characteristics,

iii. whether the band in question is determined to be in high demand or not,

iv. the degree of sharing and the minimum hop length of an assignment of a single link.

(e) The fees payable for radio frequency spectrum shall be at least sufficient to cover the costs of radio frequency spectrum management and monitoring.

4. Application Fees

(a) The standard application fees are provided in Annexure A.

(b) Application Fees for cellular bands and any other bands identified by the Commission will be specified in an invitation to apply or otherwise separately.

5. Annual Fee Determination

(a) The annual fees payable for each category of radio frequency spectrum shall either be determined by a pricing formula as described in this Schedule or by application of the minimum fee.

(b) The unit price per MHz of frequency spectrum is as stated in Annexure B to this Schedule and may be reviewed from time to time as directed by the Spectrum Regulations.

6. Exceptions

(a) Equipment that is license exempt as determined by the Spectrum Regulations is not subject to a radio frequency spectrum license fee.

(b) For short duration licenses, the spectrum fees shall be prorated based on the license period.

7. Formulae

The following formulae shall be used:

(a) Point-to-area formula

Applied to all point to area services except for amateur and aeronautical with exclusive band assignments.

Fee = (UNIT * FREQ-M * BW * HD * SHR * AF)

The fee is the multiplication of the unit price (UNIT) by the frequency factor (FREQ-M), the bandwidth (BW) in MHz, the high demand factor (HD), the sharing factor (SHR) and the area factor (AF).

(b) Point-to-point formula

Applied to all fixed links whether below or above 1GHz. The formula is as follows:

Fee = (UNIT * FREQ-F * BW *HD * SHR * HOPMINI)

The fee is the multiplication of the unit price (UNIT) by the frequency factor (FREQ-F), the bandwidth factor (BW) in MHz, the high demand factor (HD), the sharing factor (SHR) and the minimum hop length (HOPMINI).

(c) Hub Ground Station Satellite Formula

The fee for a principal hub station for uplink is determined by the following fee:

Hub ground station Fee = Max ($\$_{UL}$; UNIT * BW_{UL})

The fee is either the multiplication of the unit price (UNIT) by the uplink bandwidth (BW_{UL}) in MHz or **$\$_{UL}$**, the minimum fee for satellite uplink connections, depending on which yields the largest value.

(d) Non-hub VSAT Ground Station Satellite Formula

The fee for a non-hub Very Small Aperture Station for uplink is determined by the following fee:

Non-hub VSAT Fee = Number of Terminals * DF * Max ($\$_{CPE}$; UNIT * BW_{UL})

The fee is either the multiplication of the unit price (UNIT) by the uplink bandwidth (BW_{UL}) in MHz or $\$_{CPE}$, the minimum fee for non-Hub VSAT stations, as determined by the Commission, depending on which yields the largest value.

8. Factors and Look-up Tables

(a) Unit Price (UNIT) – UNIT is applied per MHz of bandwidth. The value of UNIT is provided in Annexure B.

(b) Bandwidth (BW) – BW is expressed as the total unpaired bandwidth assigned to a licensee in MHz.

(c) Frequency factor (FREQ-F) - The FREQ-F values associated with various frequency ranges are as follows:

Frequency Band	Centre Frequency	FREQ-F Factor
VLF	3-30 kHz	1.2
LF	30-300 kHz	1
MF	0.3-3 MHz	0.87
HF	3 - 30 MHz	0.7
VHF	30 - 300 MHz	0.54
UHF	0.3 - 1 GHz	0.38
UHF	1 - 3 GHz	0.29
SHF	3 - 8 GHz	0.21
SHF	8 - 30 GHz	0.14
EHF	above 30 GHz	0.05

(d) Frequency factor (FREQ-M) - The FREQ-M values associated with various frequency ranges are as follows:

Frequency Band	Centre Frequency	FREQ-M Factor
VLF	3-30 kHz	1.2
LF	30-300 kHz	1
MF	0.3-3 MHz	0.87
HF	3 - 30 MHz	0.7
VHF	30 - 300 MHz	0.54
UHF	0.3 - 1 GHz	0.38
UHF	1 - 3 GHz	0.29
SHF	3 - 5 GHz	0.084
SHF	5 - 30 GHz	0.042
EHF	30 - 60 GHz	0.032
EHF	above 60 GHz	0.01

(e) High Demand Factor (HD) – The HD values are as follows:

HIGH DEMAND	HD
High Demand	2
Not in High Demand	1

i. The High Demand frequency bands will be determined by the Commission.

(f) Sharing Factor (SHR) – The SHR values associated with the various degrees of sharing are as follows:

Sharing	Value of sharing factor
Exclusive	1
Shared	0.5

i. Sharing is considered to exist in instances where two or more licensees share a common frequency assignment within a common geographical area.

(g) Area Factor (AF) - The following table shows the various values of AF:

Area (sq km)	AF
0-1	0.6
1-10	1.8
10-100	5.6
100-1000	17.8
1000-5000	39.9
5000-10,000	56.4
10,000 above	73.6

(h) Discount Factor (DF) – The following table shown the various values for DF

Number of equipment/terminals (Y)	Discount factor
1 to 50	1 (no discount)
51 to 200	0.96
201 to 500	0.92
Above 500	0.88

(i) Minimum hop length (HOPMINI) - The following table shows the 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	Min Path Length (Km)
400 MHz	100
800 MHz	60
1.4/1.6/2 GHz	30
4 and 5 GHz	16
7.5 GHz	14
10 and 11 GHz	10
13/14/15 GHz	9
17/18 GHz	4
22/23 GHz	3
25/26 GHz	3

28 GHz	2
31 and 32 GHz	1.5
38 GHz	1
Higher	0

(i) Where the actual path length of the licensee's link is shorter than the minimum path length for the frequency, the HOPMINI factor in the formula shall be calculated as 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

$$\text{HOPMINI} = \sqrt{\frac{Minimum\ Path\ Length\ for\ the\ Frequency}{Actual\ Path\ Length}}$$

(ii) Where the actual path length is equal to the minimum path length for frequency spectrum, the value of HOPMINI in the formula will be 1.

9. Minimum Fees

(a) The Minimum Fees are as stated in the Annexure B.

(b) The Minimum fees are applicable to the services as defined in Annexure A.

(c) Where the radio frequency spectrum license fee computed by the relevant formula is lower than the minimum fee, then the minimum fee shall apply.

(d) For satellite hub uplink stations, the minimum fee for satellite hub uplink stations shall apply.

Annexure A. SPECTRUM LICENSE FEES SUMMARY

Description			
		Application Fee	***Formula***
1	**Land Mobile Services (non-cellular)**		
1.1	Mobile two-way radio stations	SZL 1,000.00	Point to Area formula
1.2	Cross Border	SZL 1,000.00	Point to Area formula (land area within Swaziland)
1.3	Alarm system including base station with remote stations	SZL 1,000.00	Point to Area formula
1.4	Paging systems	SZL 1,000.00	Point to Area formula
2	**Satellite Services**		
2.1	Earth station/ VSATs -Transmit/ Receive (TX/RX) - Corporate	SZL 1,000.00	Satellite or VSAT formula
2.2	Earth Station / VSATs – Transmit/Receive – Solar and Heliospheric Observatory (SOHO)	SZL 1,000.00	Satellite or VSAT formula
2.3	Amateur	Nil	Minimum Price
2.4	Terminal for radio determination services	SZL 1,000.00	Point to Area formula
2.5	Landing rights:	SZL 1,000.00	Point to Area formula
3	**Radio-determination/Aeronautical Services**		
3.1	Aeronautical stations (per airport)	SZL 1,000.00	Minimum Price
3.2	Aircraft Licence (per aircraft)	SZL 1,000.0	Minimum Price
3.3	Radio - operators Certificate	Nil	Nil
3.4	Aeronautical earth station	SZL 1,000.0	Minimum Price
3.5	Radiolocation stations e.g. Radar	SZL 1,000.0	Minimum Price
4	**Fixed services**		
4.1	Point to Point Link	SZL 1,000.00	Point to Point formula
4.2	Point to Multi-Point Link	SZL 1,000.00	Point to Area formula
4.3	Amateur Radio	Nil	Minimum Price
5	**Telemetry/Tele-command: e.g. radio equipment for measuring seismic movements**	**SZL 1000.00**	Point to Area formula
6	**Broadcasting Services**		
6.1	Sound		
6.1.1	MF-AM	SZL 1,000.00	Point to Area formula
6.1.2	HF-AM	SZL 1,000.00	Point to Area formula
6.1.3	VHF-FM	SZL 1,000.00	Point to Area formula
6.2	Television		
6.2.1	VHF	SZL 1,000.00	Point to Area formula
6.2.2	UHF	SZL 1,000.00	Point to Area formula
7	**Land Mobile Services (Cellular)**	Application Fees will be specified in the invitation to apply.	Point to Area (max AF) and max HD Factor

Annexure B

A The Unit Price per MHz paired is as follows:

2024/2025	SZL 2164
2025/2026	SZL 2164
2026/2027	SZL 2164

B The Minimum Fee for Amateur is SZL 148

C The Minimum Fee is SZL 500

D The Minimum fee for a Satellite Hub Station is SZL 15,000

E The Minimum fee for non-Hub VSAT stations, is SZL 1,440

F The HOPMINI Factor will be calculated based on link hops and frequency bands.

G The High Demand Factor of 2 is applied to Land Mobile Cellular Services.