



REVIEW OF RADIO FREQUENCY SPECTRUM PRICING

CONSULTATION DOCUMENT

ECS 04/2014

Issue Date – 11 April 2014

Response Date – 30 May 2014

UTILITIES REGULATION & COMPETITION AUTHORITY

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1 Introduction

1.1 Background

The Utilities Regulation and Competition Authority (URCA) is appointed under the Communications Act, 2009 (“Comms Act” or the “Act”) as the independent regulator of the electronic communications sector (ECS) in The Bahamas. URCA is responsible under the Comms Act for licensing undertakings that provide, operate or maintain an electronic communications network or provide an electronic communications service, including by the use of any radio spectrum. The Comms Act also provides, in sections 4 and 5 of the Act, guidelines that URCA must follow for issuing regulatory and other measures (including Determinations). The Comms Act gives URCA wide-ranging powers which are to be exercised in full compliance with principles of good regulation. Pursuant to Part VI of the Comms Act URCA is exclusively responsible for the management and regulation of radio spectrum in The Bahamas.

URCA issues this consultation document on a “Review of Radio Frequency Spectrum Pricing” (ECS 04/2014) pursuant to sections 29, 92 and 93 of the Communications Act, 2009 (the “Comms Act”). The radio spectrum is a finite and valuable national resource which is vitally important to all sectors of the communications services industry, as well as to other strategic industries and non-commercial sectors.

All Licensees that have been allocated radio spectrum under a spectrum licence issued by URCA are required to pay a Spectrum Fee. While URCA has responsibility for collecting spectrum fees from licensees, the spectrum fees collected by URCA are remitted in full to the Treasurer of the Government of the Bahamas (Comms Act, section 93(4))¹. The current spectrum fees are set out in the Fee Schedule ECS 27/2012².

Section 93 of the Comms Act governs the responsibilities of URCA and the Minister with responsibility for the ECS (currently the Prime Minister) for the setting of spectrum fees. Section 93(1) gives the Prime Minister the power to impose spectrum fees in respect of radio spectrum in the premium spectrum bands, while section 93(2) empowers URCA to impose spectrum fees for spectrum in other, non-premium, radio spectrum bands. In both cases the Comms Act provides that spectrum fees should reflect the need to ensure the optimal use of the spectrum.

URCA has reviewed the current Fee Schedule, taking account of its duties under the Communications Act and Electronic Communications Sector Policy objectives as specified in the Sector Policy itself and in section 4 of the Communications Act, including promoting the optimal use of spectrum and furthering the interest of persons in The Bahamas through promoting affordable access to high quality communications services in all regions of The Bahamas.

The objectives of the consultation are to:

¹ Section 93(4), Communications Act 2009

² <http://www.urcabahamas.bs/download/042081600.pdf>

- publish for comment the amendments and revision which URCA proposes to make to the existing spectrum fee schedule in respect of spectrum in the standard spectrum bands;
- give notice of and publish for comment the determination which URCA proposes to make in respect of fees and charges for the administration and allocation of radio spectrum, which URCA proposes to levy in accordance with section 92(2) of the Comms Act;
- publish for comment the details of the recommendations which URCA proposes to make to the Prime Minister for revisions to the existing spectrum fee schedule in respect of spectrum in the premium spectrum bands;
- explain URCA's reasoning for the proposed revisions and amendments to the current spectrum fee schedule; and
- invite comments from interested persons on URCA's proposals.

1.2 How to respond to this consultation document

Responses to this document should be submitted to URCA by 5:00 p.m. on 30 May, 2014. Persons may send their written responses or comments to the Director of Policy and Regulation, either:

- by hand to URCA's office at UBS Annex Building, 31B East Bay Street, Nassau; or
- by mail to P.O. Box N-4860, Nassau, Bahamas; or
- by fax to (242) 393-0153; or
- by email, to info@urcabahamas.bs.

URCA reserves the right to make all responses available to the public by posting responses on its website at www.urcabahamas.bs. If a response is marked confidential, reasons should be given to facilitate URCA evaluating the request for confidentiality. URCA may publish or refrain from publishing any document or submission at its sole discretion.

Section 99(1)(a) and (b) of the Comms Act collectively prescribe that if, on its own motion, URCA has reason to believe that a determination is necessary, it may make determinations relating to (amongst other things):

- (i) any obligations on a Licensee regarding the terms or conditions of any licence, including obligations in licence conditions and regulations;
- (ii) any activity set out in the Comms Act; and
- (iii) where the Comms Act provides for URCA to "determine" or "to make determinations" as is the case under section 92(1)(d).

Under section 99(2) of the said Act, in making any determination, URCA has to have consulted persons with sufficient interest under section 11 of the Comms Act and provided written reasons for its determination. Section 11(2) of the Comms Act prescribes that regulatory instruments referred to in section 13(2) of the Act such as regulations, shall be considered regulatory measures of public significance and under section 11(1), URCA shall afford persons with sufficient interest a reasonable opportunity to comment on URCA's proposals. Certain of the matters which URCA proposes to treat

with under this consultation document will require the making of a determination by URCA in respect of which URCA will follow the process outlined above.

URCA will review the responses received and publish a Statement of Results on the consultation, and issue its Final Decision, any appropriate Final Determination, and make appropriate representations to the Prime Minister.

1.3 Structure of the remainder of this document

This consultation document consists of the following parts:

- Section 1 explains how to respond to this consultation document.
- Section 2 describes the legal and policy context in respect of spectrum fees.
- Section 3 addresses the current situation, issues with the current Fee Schedule and its application.
- Section 4 discusses principles and best practice for setting spectrum fees.
- Section 5 discusses the proposed revised fee structure and the proposed level of fees.
- Section 6 sets out the determination which URCA proposes to make in respect of Spectrum Management Fees;
- Section 7 contains a summary of the consultation questions posed in this document;
- Section 8 discusses the next steps following this consultation.

2 Legal and Policy Context for Spectrum Pricing

2.1 Part V of the Communications Act 2009

The legal framework for setting fees is set out in the Communications Act (the Comms Act). The Comms Act gives the Minister and URCA various powers as described in greater detail below.

In accordance with section 31(3) of the Comms Act, the National Spectrum Plan³ designates frequency bands as either “Premium” or “Standard” spectrum. The Minister is empowered by section 30(1) of the Comms Act to decide the method of allocating the frequencies in the premium spectrum bands as specified in the spectrum plan which is formulated by URCA and approved by the Minister in accordance with section 31 of the Comms Act. To date certain bands used for cellular mobile and broadband wireless access services have been designated as premium spectrum. The remaining bands are standard spectrum.

Spectrum fees or the method of setting fees for premium spectrum bands are determined by the Minister⁴, while fees for standard spectrum bands are set by URCA⁵. In both cases, fees are to be set so as to ensure the optimal use of spectrum⁶.

In performing its functions and duties, as they relate to radio spectrum management, the Minister and URCA must ensure that spectrum is managed and used in a manner that:

- is open, objective, transparent and non-discriminatory; and
- is economically efficient and facilitates the evolution of new technologies and electronics communications services⁷.

URCA is, pursuant to section 93(4) of the Comms Act responsible for the collection of all spectrum fees, however those fees are paid directly on to the Government of the Bahamas and thus do not contribute towards URCA’s operational costs of administration and allocation of spectrum.

Section 92(1)(d) of the Communications Act allows URCA to “... determine [i.e., in accordance with the procedures specified in sections 99 and 100 of the Communications Act] ... fees and charges for the administration and allocation of state assets”.

³ ECS 03/2014, published on 10 April 2014.

⁴ See section 30(2) when read with section 93(1) of the Comms Act.

⁵ See section 30(2) read in conjunction with 93(2) of the Comms Act.

⁶ See Section 93, Comms Act, 2009

⁷ Section 32, Comms Act, 2009

2.2 Policy Framework

Policy matters pertaining to the regulation of the electronic communications sector are addressed in the Electronic Communications Sector Policy, the most recent iteration of which was published in 2009. A revised ECS Policy has been consulted on and recommended to the Government by URCA.

URCA notes the following other policies and market developments that are relevant to the determination of the level and structure of spectrum fees include:

- Liberalisation of the mobile sector in 2014⁸; and
- Universal Service policy for a set of basic communications services which may include services delivered using radio frequencies (e.g., fixed voice and internet access services and multi-channel television)⁹.
- Policies to promote small and medium sized enterprises (SMEs), particularly in the Family Islands.¹⁰

Mobile sector liberalisation will require spectrum in cellular mobile bands (and possibly for backhaul). It is imperative that the spectrum fees established for cellular mobile spectrum provide incentives for efficient spectrum use and act as a disincentive to hoarding spectrum in the cellular mobile bands.

The Government policies relating to the provision of Universal Services in The Bahamas, and the encouragement of Small and Medium Sized Enterprises within the Electronic Communications Sector point URCA towards the setting of relatively low fees in sparsely populated islands and cays, as compared to the fees set in the most populated islands of New Providence and Grand Bahama (which account for 70% and 15% of The Bahamas' population respectively).¹¹

⁸ See paragraph 50 of the Electronic Communications Sector Policy issued in April 2011 and section 114 of the Communications Act (as amended).

⁹ See paragraph 39 of the Electronic Communications Sector Policy issued in April 2011.

¹⁰ Through legislation in the form of the Small and Medium Size Enterprises Development Bill 2013 and the Family Islands Development Encouragement Bill 2013.

¹¹ Department of Statistics of the Bahamas, 2010 Census found at <http://statistics.bahamas.gov.bs/download/082103200.pdf>

3 Current Fees for Spectrum Users

3.1 Licensing Framework and the Fee Schedule

All entities that have been assigned radio spectrum by URCA under either an individual licence or a class licence requiring registration are required to pay a spectrum fee.¹² The current levels for spectrum fees in the Bahamas are set out in the Fee Schedule for 2013 (ECS 27/2012). Spectrum fees are not paid by holders of class licences that do not need to be registered or licence exempt services. A service may be licence exempt under:

- A statutory provision – section 17(1) of the Communications Act states that the Royal Bahamas Police Force, Royal Bahamas Defence Force, providers of fire brigade, ambulance, coast guard and other emergency services or military services authorised to operate in the Bahamas are exempt from licensing.
- A determination issued by URCA – for example low power devices (as defined by Part 15 of Title 47 of the FCC’s Code of Federal Regulations) are licence exempt¹³.

Spectrum licensees that have operating licences are also required to pay annual URCA Fees (which are applied to URCA’s operating costs).¹⁴ In addition, these licensees are required to pay a statutory Communications Licence Fee, set at 3% of relevant turnover.¹⁵

3.2 Fees for premium spectrum

The current fees for premium spectrum based on the Fee Schedule for 2013 are set out in Table 3-1. In reviewing these fees, URCA proposes that there are a number of issues which need to be considered as discussed in the following paragraphs.

Table 3-1: Premium spectrum fees – all charged on a national basis

Band	Spectrum Fee (\$ per annum)	Spectrum Fee (\$/MHz per annum)	Permitted services	Geography
700 MHz	\$6,000-8,000 per MHz	6,000-8,000	Cellular mobile	National
850 MHz	\$300 (per 30 kHz channels)	10,000	Cellular mobile	National
1900 MHz	\$50,000 (10 MHz)	5,000	Cellular mobile	National

¹² See Table 1, Guidance on the Licensing Regime under the Communication Act, 2009, ECS 15/2009 and Part XVI of the Communications Act.

¹³ Spectrum Exemption, URCA, ECS09/2009

¹⁴ Communications Act, section 92(1).

¹⁵ Communications Act, section 91(1).

Band	Spectrum Fee (\$ per annum)	Spectrum Fee (\$/MHz per annum)	Permitted services	Geography
1.7/2.1GHz	\$3,000 (5 MHz)	600	Broadband wireless access (fixed or nomadic)	National
2.3 GHz	\$3,000 (5 MHz)	600	Broadband wireless access (fixed or nomadic)	National

At present only broadband wireless access services are permitted by URCA to operate in the 1.7/2.1 GHz and 2.3 GHz bands and the spectrum fees charged for usage of these bands are significantly lower than the fees charged for the 850 MHz and 1900 MHz cellular mobile bands. This restriction on mobility is, in URCA's view, likely to be lifted when the mobile sector is liberalised in which case URCA considers a higher fee may be justified on the grounds that the spectrum will then be more valuable as it will be able to be used to provide cellular mobile services. This suggests to URCA that the value of 1.7/2.1 GHz and 2.3 GHz should be revised to reflect the opportunity cost of these bands. Similarly, the fees for 700 MHz are lower than the fees for 850 MHz despite having similar propagation characteristics and supporting cellular mobile services.

URCA considers the relative values of the frequency bands for cellular mobile should be consistent with the propagation characteristics and the supply available at the different frequency bands. Figure 3-1 shows the relationship between frequency and cell radius for different mobile broadband speeds assuming deployment based on LTE technology, 2x10MHz bandwidth and rural outdoor coverage.¹⁶ As URCA believes it has demonstrated, sub-1 GHz spectrum offers significant gains in terms of coverage compared to frequencies above 1 GHz. This is the case across different assumed data rates.

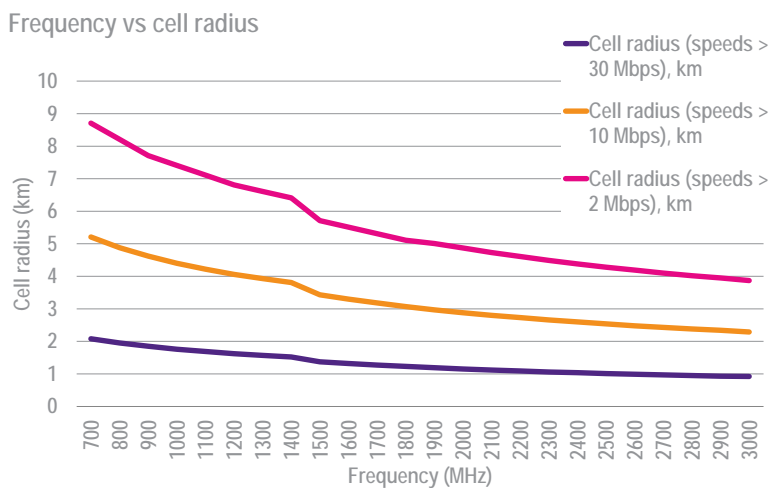
Although it is not classified as a premium spectrum band, URCA notes that the 2.5 GHz band has similar characteristics and uses as the bands currently designated as premium spectrum. The fees for 2.5 GHz are lower than the fees for 2.3 GHz despite their similar characteristics and both bands being harmonised for use by mobile broadband services internationally.

Table 3-2: Spectrum fees for 700 MHz and 2.5 GHz

Band	Spectrum Fee (\$ per annum)	Spectrum Fee (\$/MHz per annum)	Permitted services	Geography
2.5 GHz	\$800 (6 MHz)	133	Point-to-multipoint	Per island

¹⁶ See also: van Hooft, L, Building next generation broadband networks in emerging markets. In "Making Broadband Accessible for All", Vodafone Policy Paper Series, May 2011; Markendahl, J; Makitalo, O; Molleryd, B; and Werding, J., "Mobile broadband expansion calls for more spectrum or base stations: analysis of the value of spectrum and the role of spectrum aggregation", Conference paper, 21st European Regional ITS Conference, Copenhagen, September 2010.

Figure 3-1: Frequency versus cell radius for cellular mobile



Source: Aegis Systems

In URCA’s view, it might be expected that frequencies below 1 GHz would be worth 60-80% more than those above 1 GHz. In general, international experience has shown that higher frequencies (i.e. above 1 GHz) tend to provide less coverage and less versatility as they become increasingly limited to line of sight transmission and are subject to increasing attenuation. In addition, the greater supply at higher frequencies in itself reduces the market value for these frequencies.

Consultation Question 1: What are your views on the fee levels for the current premium spectrum bands?

Consultation Question 2: Do you agree with URCA’s proposal that spectrum fees should be adjusted to reflect the propagation characteristics and the available supply of the frequency bands?

3.3 Fees for Standard Spectrum

The standard spectrum fees in the Fee Schedule for 2013 can be classified into two main categories – station fees and bandwidth related fees. Station fees, as discussed in Section 4, do not vary by bandwidth assigned and, URCA considers, are appropriate in cases where spectrum users have access to a common pool of frequencies rather than an individual assignment. Table 3-3 show the non-bandwidth related fees in the Fee Schedule for 2013. These fees are applied on a per island basis.

Table 3-3: Standard fees (non-bandwidth related)

Service	Fee (\$)
Aeronautical fixed ground station	300
Ship Radio Telephone Station fitted with GMDSS equipment	150
VSAT systems	500
Earth stations with dishes larger than 3.8 meters	4,500
Amateur radio station	25
Experimental radio station	100
Broadcast radio (AM and FM)	500
Broadcast TV station	3,000

URCA acknowledges there are some anomalies in Table 3-3, namely broadcast radio, VSAT and earth stations. URCA is aware that internationally, spectrum fees for these services are typically charged on a bandwidth related basis rather than a flat rate station fee as exclusive assignments must be granted for these services to limit interference between users. URCA is aware that this is a particular concern for broadcast radio in The Bahamas due to congestion in the FM radio band (87.5-108 MHz) on New Providence where all available FM frequencies have been assigned.

The bandwidth related fees currently charged by URCA for standard spectrum in the Fee Schedule are shown in Table 3-4. These fees are all proposed to be charged on a per island basis with no differences in the level of fees between islands.¹⁷ The fees, expressed as a fee/MHz, vary considerably between bands and services in an unsystematic way. URCA considers that it would be desirable on fairness and efficiency grounds for the current Fee Schedule to be revised to ensure a more consistent fee/MHz for each band.

¹⁷ Except for newly opened bands above 2.6 GHz, i.e. 11 GHz, 12 GHz and 42 GHz. See "Policy for new spectrum bands – 700 MHz, 11 GHz, 12 GHz, 42 GHz" (ECS 09/2012) <http://www.urcabahamas.bs/download/030200900.pdf>

Table 3-4: Standard spectrum (bandwidth related)

Band	Fee (\$)	Fee (\$/MHz)	Service
150-174 MHz, 400-470MHz	\$250 per single 25kHz channel \$500 per 25kHz pair	\$10,000/MHz	Land mobile fixed station, some fixed point to point links and telemetry
VHF (174-216 MHz), UHF TV (470-698MHz) bands	\$3,000 per 6MHz bandwidth	\$500/MHz	TV
806-821/851-866 MHz	\$390 – private trunking (125kHz paired) \$1,300 – public trunking (125 kHz paired)	\$1,580/ MHz; 5,200/MHz	Private trunked radio; Public trunked radio
929-932 MHz	\$100 - private paging (25 kHz) \$1,300 – public paging (25 kHz)	\$4,000/MHz; \$52,000/MHz	Private paging; Public paging
944-951 MHz	\$250 – per 100 kHz	\$2,500/MHz	Studio to transmitter links
2.5 GHz	\$800 – per 6 MHz	\$133/MHz	Point to multi-point
3.5 GHz	\$2,000/MHz – first pair of 1 MHz channels; \$1,000/MHz – additional pairs of 1MHz channels	\$2,000/MHz – first pair of 1 MHz channels; \$1,000/MHz – additional pairs of 1MHz channels	Point to multi-point
Many bands above 1 GHz	Up to 50 kHz – \$450/link 50kHz to 3.5MHz – \$620/link 3.5-30MHz – \$800/link 30MHz and more - \$1200/link	Varies with link bandwidth e.g. 25kHz – \$10,000/MHz 3.5MHz – \$229/MHz 7 MHz – \$114/MHz 56 MHz – \$21/MHz	Fixed point to point services

Consultation Question 3: What are your views on the current fees charged on a non-bandwidth related basis? Should the fees for broadcast radio be charged on a bandwidth-related basis?

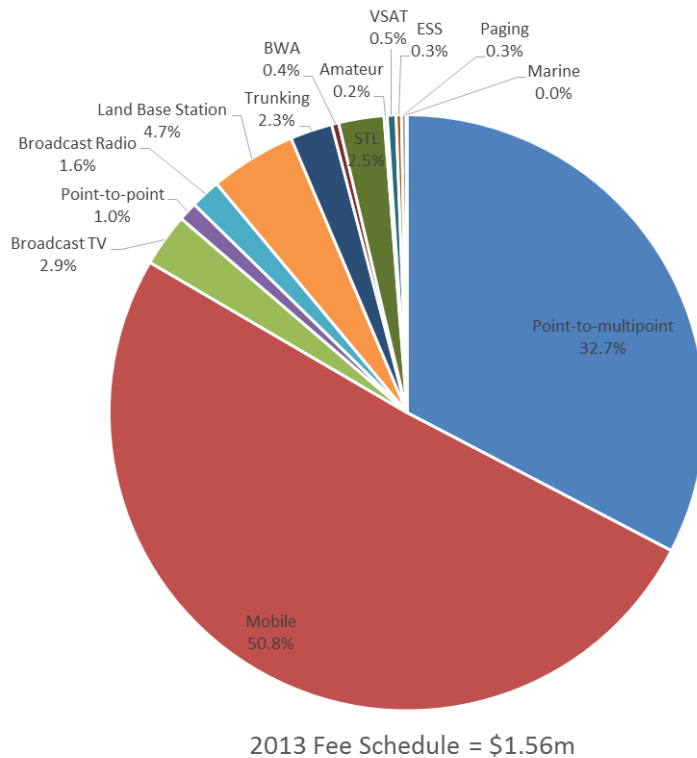
Consultation Question 4: What are your views on the current fees charged on a bandwidth related basis?

Consultation Question 5: Do you agree with URCA’s proposal that the methodology for changing Spectrum Fees in URCA’s Fee Schedule should be revised to ensure a more consistent fee/MHz for each band?

3.4 Spectrum fees collected by URCA for 2013

Applying the current Fee Schedule (ECS 27/2012) to the spectrum licensed according to URCA’s Public Register of licensees (ECS-09/2010)¹⁸ results in spectrum fees for 2013 amounting to approximately \$1.56 million. The breakdown by service is shown in Figure 3-2.

Figure 3-2: Breakdown of spectrum fees by service (based on current Fee Schedule)



In practice, URCA notes that there are a small number of cases in which legacy fee arrangements remain in place which reduce the amount of spectrum fees paid by certain licensees. The result of these arrangements is that the actual amount collected by URCA for 2013 is approximately \$1.1 million, rather than the \$1.56 million reported above. URCA has given notice to the relevant licensees that these arrangements have lapsed in accordance with section [] of the Comms Act, and that the full licence fees as set out in URCA’s Fee Schedule will be payable from 2014.

Another issue that has come to URCA’s knowledge is that spectrum fees for studio-to-transmitter links (STLs) are higher than the corresponding broadcast radio fees. This suggests to URCA that the STL and broadcast radio fees are not set at the right levels in the current Fee Schedule.

¹⁸ <http://www.urcabahamas.bs/download/014668500.pdf>

At present the spectrum fees collected by URCA are remitted to the Government and URCA recovers its spectrum management costs, which are estimated to be approximately \$325,000 per annum (excluding depreciation/capital costs), through the URCA Fee. This arrangement means that non-spectrum users (e.g. some Internet Service Providers) are contributing to spectrum management costs and that the distribution of payment of URCA's spectrum management costs is disproportionate to the causation of those costs.

3.5 Summary of issues identified

URCA considers that there are a number of issues identified in this section of the consultation document which would need to be addressed in the new Fee Schedule. These include the following:

- **Structure and scope** – The current Fee Schedule is structured around particular applications and/or frequency bands. This results in an inconsistent fee structure across bands, even where these are used by the same services and means that each time a new band is opened up a new set of fees has to be determined. Similarly if a new application uses a particular band then in principle a new set of fees would need to be developed.¹⁹ The new Fee Schedule will need to address those inconsistencies.
- **Application of the Fee Schedule** – As discussed in paragraph 3.11, there is inconsistency in the application of the Fee Schedule due to some legacy fee arrangements. These will need to be replaced to ensure non-discrimination and adherence to the principles and best practice discussed in Section 4.
- **Promoting optimal spectrum use** – This depends on both the level and structure of the fees charged. In general, fees related to bandwidth assigned should provide the incentive for efficient use if the fees are set at the right level. The wide variation in the levels of fee/MHz across bands below 4 GHz (Tables 3-1, 3-2, 3-4) suggest that some fees may not be at the right level and will need to be revised.
- **Promoting spectrum use in other islands** – At present fees for other islands are at the same level as New Providence despite their significantly lower population densities.²⁰ This may not lead to optimal spectrum use on islands where spectrum is plentiful. To meet universal service and SME policy objectives, lower fees for less populated islands may be appropriate.
- **URCA's spectrum management cost recovery** – The cost of spectrum management activities are attributed to spectrum users and should ideally be recovered from spectrum licensees. The current mechanism for recovering URCA's spectrum management costs includes non-spectrum

¹⁹ The issue was recognised when several new bands were opened up in 2012, and an interim fees schedule was proposed. See ECS 09/2012.

²⁰ According to 2010 Census data, New Providence makes up 70% of the population of the Bahamas, while Grand Bahama comprises 15%. None of the other islands make up more than 5% of the population.

users who do not contribute to these costs. The current mechanism should therefore be improved to ensure more equitable fees and that only spectrum users are charged for URCA's spectrum management activities.

**Consultation Question 6: Do you agree with the five issues identified in the above paragraph?
Are there any additional issues which should be considered by URCA?**

4 Best Practice for Setting Spectrum Fees

As demand for radio spectrum grows, it is increasingly important for URCA to ensure that all of the available radio spectrum is used in the most efficient and effective manner as mandated in section 32(1) of the Comms Act. Spectrum Fees have become an important tool used internationally by spectrum management organisations similar to URCA to encourage efficient use of the radio spectrum and discourage licensees from acquiring or retaining more spectrum than they actually need. The remainder of section 4 discusses international best practices for setting spectrum fees.

4.1 Principles

It is widely recognised internationally that best practice requires that spectrum fees be set in a fair, objective and transparent manner without incurring undue administrative costs while promoting efficient spectrum use²¹.

- Fairness and objectivity mean that fees should be based on objective factors and all licence holders in a given frequency band should be treated on an equitable basis. This would preclude, for example, preferential treatment to different users in a given frequency band.
- Transparency requires that the basis on which fees are calculated should be made clear in a published document. All fees should be set based on a published schedule.
- Administrative costs will be low if the fee schedule is simple to administer. The simplest fee schedule would be one involving a flat fee payment; however this would not promote efficient spectrum use in many circumstances.
- Administrative simplicity for regulators and licensees needs to be balanced against the requirement to encourage efficiency of spectrum use if fees are set taking account of parameters such as bandwidth, frequency band or coverage.

These principles are reflected in the European Union Authorisation Directive²² which requires that administrative charges levied on spectrum licensees should recover spectrum management costs (Article 12), and that fees to ensure optimal use of spectrum should be objectively justified, transparent, non-discriminatory and proportionate (Article 13).

To provide incentives for efficient spectrum use, spectrum fees should be related to the amount of spectrum assigned, because users can then reduce their payments by reducing their spectrum holdings. Fees with incentives for efficient use must also be set at the right level – if they are too low then users may continue to hoard spectrum; if they are too high spectrum may be left unused.

²¹ Under Sections 32(1) of the Communications Act, 2009.

²² Directive 2002/20/EC of the European Parliament and of the Council of 7 March 2002 on the authorisation of electronic communications networks and services.
http://europa.eu/legislation_summaries/information_society/legislative_framework/l24164_en.htm

Consultation Question 7: What are your views on the principles for setting spectrum fees?

Consultation Question 8: Do you agree that in all cases spectrum fees should be set to ensure the optimal use of spectrum?

Consultation Question 9: Do you agree that universal service and SME policies should be considered in setting spectrum fees?

4.2 Fees structure

For the purposes of setting fees, spectrum assignments can be characterised by three dimensions²³ – bandwidth, geographic area and time. When referring to the amount of spectrum assigned, the following measures are typically used:

- Bandwidth – this is measured by the number of kHz or MHz assigned
- Geographic area – usually interpreted by regulatory authorities strictly speaking this should be the area over which use is denied to other licensees (sometimes referred to as the area sterilised)
- Time – duration of use in fraction of a day, week or year

Fees formulae that reflect these ideas typically take the form of:

$Fee = C * BW * TF * CF * FBF$, where:

C = Constant value/MHz that may (or may not) vary by frequency band or service to reflect a mix of commercial and social factors that depend on the services that may use the band

BW = Bandwidth assigned in MHz

TF = Time factor which is set to a fraction of a day, week or year that the frequencies are assigned

FBF = Frequency Band Factor, which reflects the increased utility and more limited availability of spectrum in lower frequency bands and in some cases the higher spectrum management costs associated with those bands (due to increased probability of interference)

CF = Coverage Factor, which reflects the area over which use by other licensees is denied i.e. it is the area sterilised by an assignment. Some regulators set this factor to also vary by the (approximate) size of the population served in the coverage area or may use an urban/rural differentiation in fees through this factor.

This general formula-based approach to setting fees assumes the use of a frequency in a given location by a user denies others from using the same frequency. This is sometimes not the case, for example, where spectrum licence holders share frequencies from a common pool as occurs with

²³ Polarisation may give another dimension but is not usually specified by the spectrum regulator and is only feasible for certain applications. It is not considered explicitly here.

aircraft, ship or amateur station licences and licences in some shared satellite bands. The standard approach internationally is to set a flat rate fee per station.

Consultation Question 10: Do you agree with the use of a formula-based approach to setting spectrum fees for services which require exclusive spectrum use? If not, please explain your reasoning and suggest an alternative approach.

Consultation Question 11: Do you agree that for a flat rate fee per station is appropriate in cases where users share a common pool of frequencies? If not, please explain your reasoning and suggest an alternative approach.

4.3 Level of fees

A key consideration that URCA proposes will affect the fee level is whether the frequencies assigned are in a band that is congested, which means demand for the spectrum is likely to exceed supply at low prices. In these cases, URCA is aware from international experience that it is economically efficient to set fees that reflect the opportunity cost of spectrum access (i.e. the value of the spectrum to the next best alternative use or user of the spectrum). Opportunity costs are revealed through spectrum auctions or market trades. This is the reason why international auction benchmarks are often used to set fees for congested spectrum that is not auctioned.

In The Bahamas, URCA has preliminarily concluded that, at present the FM radio band on New Providence is congested as there currently are no more frequencies available for new users. In addition, URCA is of the preliminary view that the bands that could be offered to new mobile operators, namely, 700MHz; 850MHz; 1900MHz and 1.7/2.1 GHz (the AWS band), are likely to become congested when the sector is liberalised. In the longer term, take-up of mobile broadband devices (e.g. smartphones and tablets) and new high-bandwidth applications will drive growth in mobile data traffic.²⁴ URCA is therefore of the view that the 2.5 GHz or 3.5 GHz band and any new bands made available for mobile below 3 GHz (e.g. the 600 MHz band²⁵, extensions to the 850MHz band and extensions to the AWS band²⁶) could also be in high demand.

For bands that are not congested, fees should broadly recover the costs of spectrum management. The reason for using the costs of spectrum management to set a floor on fee levels is that this ensures the benefits from spectrum use exceed the costs of making the spectrum available.

Consultation Question 12: Do you agree with the general principle that fees for congested bands should reflect opportunity cost of spectrum access and that fees for bands that are non-congested should be broadly in line with the costs of spectrum management?

²⁴ Global mobile data traffic is forecast to grow at a CAGR of 66 percent from 2012 to 2017 (Cisco VNI, February 2013).

²⁵ <http://www.fcc.gov/topic/incentive-auctions>

²⁶ <http://www.fcc.gov/rulemaking/12-70>

5 Proposed Fees

5.1 Outline of URCA's Approach

The proposals for setting spectrum fees given in this section distinguish between fees for applications that share a common pool of frequencies – referred to as station licence fees – and fees for applications that deny access to spectrum – referred to as bandwidth related fees. For the latter we develop a fees formula similar to that discussed in Section 4.

Station licence fees are set on a per station basis independent of the number of radios or bandwidth used. In most countries such fees apply where a licence authorises access to a pool of radio frequencies that is designated internationally for the licensed use and that is intended to be shared by other holders of such licences. The applications for which such fees are typically applied include amateur radio licences, aeronautical ground station and aircraft station licences, and ship station licences.

In The Bahamas, station fees are applied more widely as shown in Table 3-3 above and include experimental radio stations, broadcast radio and TV stations, VSAT systems and satellite earth stations.

5.2 Station fees – amateur, aeronautical, ship, experimental radio

For amateur, aeronautical and ship station licences, international comparisons suggest there is little reason to change the current fee levels given the nature of spectrum use. Hence it is recommended that fees are kept at current levels.

For experimental radio stations, the current fees are low and there is little reason to change the current fee given the desire to promote experimental radio use and the availability of spectrum in many bands to accommodate such services.

5.3 Station fees – satellite services

For satellite services (VSAT systems, earth stations), it is common international practice for satellite earth station fees to vary by bandwidth and frequency band used, much as would be the case with other applications that require interference protection over a defined geographic area and so deny use of spectrum to other licensees.²⁷

However this is not the case for satellite services in the Bahamas. Although the Fee Schedule for 2013 sets out fees per channel for VSAT systems, in practice URCA does not vary fees by the number of channels used because it is not able to determine the number of channels used by a system.

²⁷ Satellite earth station fees are calculated using parameters such as bandwidth, frequency band, number of terminals and type of service, in a number of countries (e.g. Bahrain, Hong Kong, Norway, Portugal, Trinidad & Tobago, UK).

The very low demand for satellite use in The Bahamas suggests that there may be little reason to change the current fees, although there could be a case on consistency grounds for applying a bandwidth related charge considering that satellite services share bands with other fixed services (point to point and point to multi-point). However information held by URCA on the bandwidth of the earth stations and VSAT systems in use is incomplete.

On balance, a flat fee structure is proposed as there are very few satellite assignments in the Bahamas and the introduction of a bandwidth-related fee structure is likely to increase administrative costs.

For administrative simplicity the following fee schedule for satellite services is proposed:

- a flat fee is charged irrespective of the number of channels carried by the satellite service
- a distinction is made between satellite services for which terminals have dish sizes below 3 metres and those for which terminals have dish sizes at or above 3 metres such that the latter are charged a higher fee²⁸
- the fee levels for satellite services are \$500 (dish size below 3 metres) and \$4,500 (dish size at or above 3 metres)

5.4 Broadcast radio

For broadcast radio, a fee of \$500 per assignment (AM or FM) is charged and does not vary by island. Demand for FM radio licences in New Providence is high (with 28 radio stations in operation) such that there are now no spare frequencies. It is therefore proposed that fees are raised to ration demand.

Broadcast radio is a point to multi-point application similar to land mobile and use of spectrum by a licensee denies its use to others. It is therefore proposed that spectrum fees for broadcast radio set in a similar way as other point to multi-point services, i.e. on a bandwidth-related basis.

5.5 Broadcast TV

For terrestrial broadcast TV, a charge of \$3,000 per 6 MHz assignment applies and does not vary by island. There is currently one broadcast TV station in The Bahamas – the public service broadcaster Broadcasting Corporation of the Bahamas (BCB) – that uses frequencies in the VHF band. Given the high cable TV penetration in the Bahamas, demand for broadcast TV frequencies is anticipated to be low, although there could in future be commercial interest in delivering digital terrestrial TV.

Broadcast TV, like broadcast radio, is a point to multi-point application and fees should be charged in the same way as other similar services. It is therefore proposed that spectrum fees for broadcast TV services be set on a bandwidth-related basis for new commercial broadcasters. However a concession for public service broadcasting is proposed for BCB and any future public service broadcaster with fees set at current levels of \$3,000 (for 6 MHz).

²⁸ Most VSAT systems have terminals with dish sizes of less than 3 metres.

Table 5-1 summarises the proposed fees for station licences.

Table 5-1: Proposed station licence fees (non-bandwidth related)

Service	Current fee (\$)	Proposed fee (\$)
Aeronautical fixed ground station	300	300
Ship Radio Telephone Station fitted with GMDSS equipment	150	150
VSAT systems	500	500
Earth stations with dishes larger than 3.8 meters	4,500	4,500
Amateur radio station	25	25
Experimental radio station	100	100
Broadcast radio (AM and FM)	500	Bandwidth-related fee
Broadcast TV station	3,000	Bandwidth-related fee (\$3,000 for public service broadcaster)

Consultation Question 13: Do you agree that spectrum fees for amateur, aeronautical, ship and experimental radio stations be kept at the current levels?

Consultation Question 14: Do you agree with the proposed fee structure and fee levels for satellite services?

Consultation Question 15: Do you agree that spectrum fees for broadcast radio and broadcast TV be set on a bandwidth-related basis? Do you agree that fees for public service broadcasters be set at current levels?

5.6 Bandwidth related fees

This section discusses how the general fee formula below can be applied in the Bahamas for the calculation of bandwidth-related fees.

$$Fee = C * BW * TF * IF * FBF$$

The bandwidth factor (*BW*) is straightforward as this is based on the amount of bandwidth (in MHz) for which a licensee is granted exclusive access.

The time factor (*TF*) is based on the duration of assignment within a year. In most cases *TF* would be 1 if the licence is valid for the entire year. Fees for temporary licences would be pro-rated accordingly.

In relation to coverage, apart from cellular mobile services which are assigned nationally, all other spectrum assignments for “standard spectrum” are made on a per island basis. There are a number of good reasons for fees to vary broadly with the island population.

- For a particular band, the value of spectrum to users will be higher on an island with larger population, all things equal
- Universal service and SME objectives will be promoted if lower values are applied to sparsely populated islands.

Instead of a coverage factor by area, it is proposed that an Island Factor (*IF*) be applied to all bandwidth related fees, where *IF* would be lower for islands with small populations. The following values for *IF* are proposed:

- *IF* = 1 for National and New Providence
- *IF* = 0.2 for Grand Bahamas
- *IF* = 0.1 for any other island.

Setting the same *IF* value for a national and New Providence licence provides an incentive for licensees to roll out services beyond New Providence.

The Frequency Band Factor (*FBF*) should reflect the characteristics of different frequency ranges in terms of the total available bandwidth, typical channel widths, and versatility (i.e. the range of applications that can be delivered in a particular frequency range, in particular the suitability for mobile and broadcast services that can only be delivered by means of radio).

In considering the *FBF* values for specific frequency bands, a balance of the following factors was sought:

- Reflecting the physical characteristics of different frequency bands, including the relative transmission range that can be achieved and the interference environment (low frequencies tend to operate in a “noisier” environment than higher frequencies);
- Reflecting equipment availability and so demand for the frequencies
- Encouraging the use of vacant higher frequencies
- Avoiding undue complexity in the fee schedule and very large changes in fees.

Table 5-2 shows the five proposed frequency ranges, corresponding to the main frequency bands currently or expected to be in use in The Bahamas, and the *FBF* values reflect the approximate relative transmission range achievable in each frequency range.

Table 5-2: Proposed frequency band factor (FBF) values for standard spectrum fee formula

Frequency	FBF	Principal services using the band
Up to 960 MHz	1	Broadcasting (TV and radio), land mobile, aeronautical, maritime, trunked radio, paging, cellular mobile, studio to transmitter links
960-2200 MHz	0.5	Aeronautical, fixed links, cellular mobile
2.2 – 6.7 GHz	0.05	BWA, C band satellite links, fixed links, cellular mobile (in future at 2.5 GHz)
6.7-30 GHz	0.01	Fixed links (medium range), Ku and Ka satellite bands
Above 30 GHz	0.005	Fixed links (short range)

In setting the levels of the constant factor (*C*), the main consideration is the impact on the level of fees and so on spectrum users. The constant factors have therefore been set to recover a similar level of revenues as would be implied by the current Fee Schedule, although the implementation of a more consistent, bandwidth-related fee structure inevitably means fees may go up for some users and down for others.

The second consideration is the appropriate level for the premium fees for bands used by mobile services. URCA has undertaken international benchmarking of these fees and finds that (as at present) mobile bands will require a higher constant factor than for other frequency bands. The following values for *C* are proposed:

- *C* = \$8,500/MHz for all services
- *C* = \$13,000/MHz for mobile services

It is common practice to set a minimum fee per assignment regardless of the value calculated by the bandwidth-related formula. It is proposed that a minimum value of \$100 would be reasonable for the Bahamas.

In summary the following formula for bandwidth-related fees is proposed:

$Fee = C * BW * TF * IF * FBF$, where:

C = \$8,500/MHz for all services and \$13,000/MHz for mobile services

BW = bandwidth assigned in MHz

TF = duration of licence, expressed as proportion of one year

IF = 1 for National or New Providence, 0.2 for Grand Bahama, 0.1 for any other island

FBF = 1 for frequencies up to 960 MHz; 0.5 for 960-2200 MHz; 0.05 for 2.2-6.7 GHz; 0.01 for 6.7-30 GHz; 0.005 for frequencies above 30 GHz.

Table 5-3 compares the current with the proposed fees based on the application of above formula.

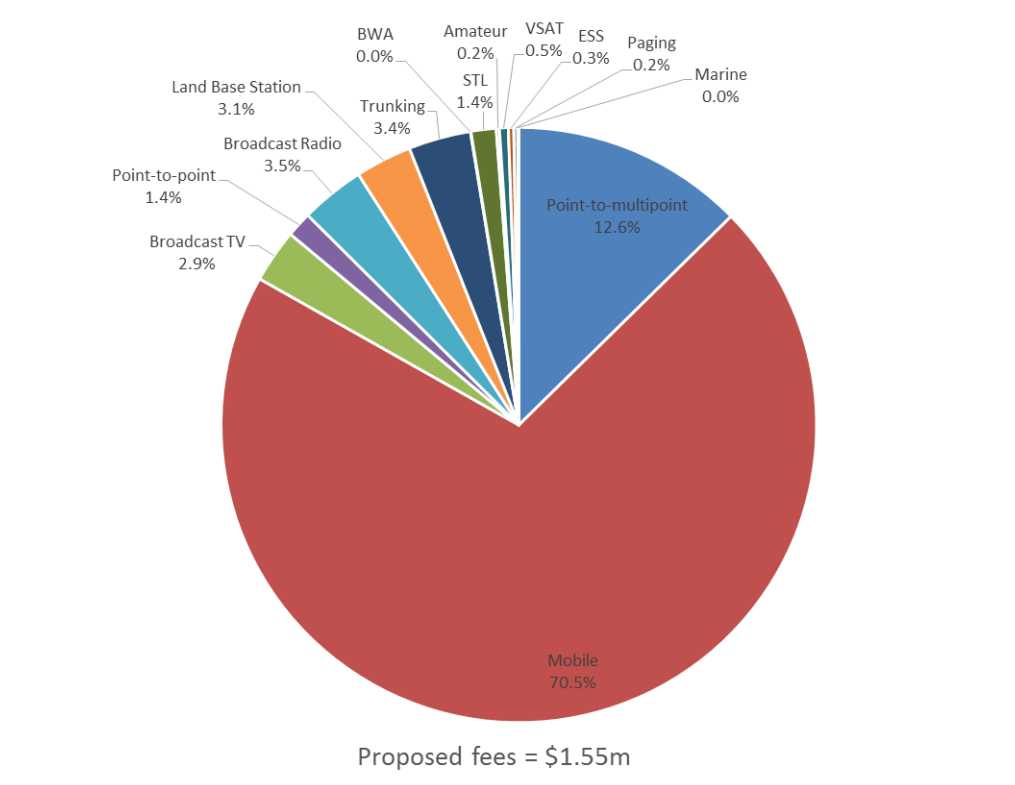
Table 5-3: Proposed bandwidth-related fees

Service and bandwidth assumed	Current fee (as per 2013 Schedule)	Proposed fee (National/New Providence)	Proposed fee (Grand Bahama)	Proposed fee (any other island)
AM radio – 30 kHz (national)	500	255	NA	NA
FM radio – 200 kHz	500	1,700	340	170
Land mobile – 25 kHz (below 470 MHz)	500	212.5	100*	100*
Private paging – 25 kHz	100	212.5	100*	100*
Private trunking – 250kHz	390	2,125	425	212.5
Public paging – 25 kHz	1300	212.5	100*	100*
Public trunking – 250 kHz	1300	2,125	425	212.5
STL – 100 kHz	250	850	170	100*
TV – 6 MHz (commercial)	3000	51,000	10,200	5,100
Point to multi-point				
At 2.5 GHz – 6 MHz	800	2,550	510	255
At 3.5 GHz – 2 MHz (first)	4000	850	170	100*
At 3.5 GHz – 2 MHz (others)	2000	850	170	100*
Point to point links 2.2-6.7 GHz with bandwidth of:				
2x 50 kHz	450	100*	100*	100*
2x3.5 MHz	620	2,975	595	297.5
2x14 MHz	800	11,900	2,380	1,190
2x30 MHz	1200	25,500	5,100	2,550
Point to point links 11 GHz with bandwidth of:				
2x 50 kHz	2	100*	100*	100*
2x3.5 MHz	140	595	119	100*
2x14 MHz	560	2,380	476	238
2x30 MHz	1200	5,100	1,020	510
Mobile services (national)				
Mobile 700 – 1 MHz	8,000	13,000	NA	NA
Mobile 850 – 1 MHz	10,000	13,000	NA	NA
Mobile 1900 – 1 MHz	5,000	6,500	NA	NA
Mobile 1.7/2.1 GHz – 1 MHz	5,000	6,500	NA	NA

Notes: $IF=1$ (New Providence); $IF = 0.1$ (any other island). $C=8500$ for all services; $C=13,000$ for mobile. $TF = 1$ for all. * Minimum fee of \$100 applied.

Applying the proposed station fees and bandwidth-related fees discussed, the overall spectrum fees raised based on current spectrum assignments would be \$1.55 million which is almost equivalent to the \$1.56 million that would have been raised if the current Fee Schedule had been fully applied. The breakdown by service is shown in Figure 5-1 below.

Figure 5-1: Breakdown of spectrum fees by service (based on proposed fees)



Consultation Question 16: What are your views on the proposed factors (i.e. C , BW , TF , IF , BW , FBF) in the formula for the bandwidth-related fees? Do you agree with the proposed values? If not, please explain your reasoning and suggest an alternative approach.

6 Recovery of spectrum management costs

As discussed in Section 4, best practice suggests that the costs of spectrum management activities by a regulator should be recovered directly from the spectrum users it licenses. URCA's annual spectrum management operating costs are estimated at \$325,000 (i.e. excluding depreciation or capital costs) which is approximately 21% of the total spectrum fees. These costs relate to the day to day administration of radio spectrum including URCA's monitoring of the use of spectrum, investigation of complaints of interference, and conduct of spectrum planning activities.

Section 92 provides:

(1) ... URCA may determine one or more of the following charges or fees –

... (d) other fees and charges for the administration and allocation of state assets.”

Section 92(2)(a) provides that the fees levied under section 92 shall be set on an objective, non-discriminatory, transparent and proportionate basis.

URCA notes that currently its costs for the administration and allocation of radio spectrum (a state asset pursuant to section 2 of the Comms Act) have previously been accounted for under the URCA Fee charged to holders of Individual Operating Licence and Class Operating Licences requiring registration. URCA considers that it would be more consistent with the provisions of section 92(2) for those costs to be recovered from persons holding spectrum licences, as the costs directly pertain to those licensees.

URCA has considered several methods for the recovery of the fees from licensees, and proposes for simplicity and feasibility, to determine that an annual administrative fee per licensee set at 21% of the payable spectrum fee be levied to cover URCA's spectrum management costs. The advantages of this approach, compared to the other methods considered, are that it is clear and simple to administer, and fair in that large users of spectrum who generally contribute more to URCA's spectrum management costs would pay more than smaller users.

The revised Fee Schedule is provided in Annex A.

URCA proposes to make a determination that:

All holders of Individual Spectrum Licences, Class Spectrum Licences Requiring Registration, and Class Spectrum Licences not Requiring Registration, pay a Spectrum Management Fee calculated at 21% of the Spectrum Fee payable under their licence. This fee shall take effect from 1 January 2015, and shall be invoiced annually by URCA together with the applicable Spectrum Fee and payable within thirty (30) days of the issuance of the relevant invoice.

Consultation Question 17: Do you agree with the proposed approach for the recovery of spectrum management fees and the determination which URCA proposes to make? If not, please explain your reasoning and suggest an alternative approach.

7 Summary of Consultation Questions

Consultation Question 1: What are your views on the fee levels for the current premium spectrum bands?

Consultation Question 2: Do you agree with URCA's proposal that spectrum fees should be adjusted to reflect the propagation characteristics and the available supply of the frequency bands?

Consultation Question 3: What are your views on the current fees charged on a non-bandwidth related basis? Should the fees for broadcast radio be charged on a bandwidth-related basis?

Consultation Question 4: What are your views on the current fees charged on a bandwidth related basis?

Consultation Question 5: Do you agree with URCA's proposal that the methodology for changing Spectrum Fees in URCA's Fee Schedule should be revised to ensure a more consistent fee/MHz for each band?

Consultation Question 6: Do you agree with the five issues identified in the above paragraph? Are there any additional issues which should be considered by URCA?

Consultation Question 7: What are your views on the principles for setting spectrum fees?

Consultation Question 8: Do you agree that in all cases spectrum fees should be set to ensure the optimal use of spectrum?

Consultation Question 9: Do you agree that universal service and SME policies should be considered in setting spectrum fees?

Consultation Question 10: Do you agree with the use of a formula-based approach to setting spectrum fees for services which require exclusive spectrum use? If not, please explain your reasoning and suggest an alternative approach.

Consultation Question 11: Do you agree that for a flat rate fee per station is appropriate in cases where users share a common pool of frequencies? If not, please explain your reasoning and suggest an alternative approach.

Consultation Question 12: Do you agree with the general principle that fees for congested bands should reflect opportunity cost of spectrum access and that fees for bands that are non-congested should be broadly in line with the costs of spectrum management?

Consultation Question 13: Do you agree that spectrum fees for amateur, aeronautical, ship and experimental radio stations be kept at the current levels?

Consultation Question 14: Do you agree with the proposed fee structure and fee levels for satellite services?

Consultation Question 15: Do you agree that spectrum fees for broadcast radio and broadcast TV be set on a bandwidth-related basis? Do you agree that fees for public service broadcasters be set at current levels?

Consultation Question 16: What are your views on the proposed factors (i.e. C, BW, TF, IF, BW, FBF) in the formula for the bandwidth-related fees? Do you agree with the proposed values? If not, please explain your reasoning and suggest an alternative approach.

Consultation Question 17: Do you agree with the proposed approach for the recovery of spectrum management fees and the determination which URCA proposes to make? If not, please explain your reasoning and suggest an alternative approach.

8 Conclusion and Next Steps

URCA invites responses on this Consultation Document, including the Preliminary Determination, from all interested parties. Any responses on this Preliminary Determination should be submitted to URCA by 5 p.m. on **30 May 2014**.

URCA is encouraging all interested parties, including the named licensees to make written submissions on the consultation. URCA will review all responses and comments received to the consultation and:

- In respect of the Spectrum Fees for Standard Spectrum Bands, issue its decision and revise the Fee Schedule accordingly;
- In respect of the Spectrum Management Fee, issue any Final Determination which URCA decides to make with thirty (30) days of the closing date for receipt of comments, and make such revisions to the Fee Schedule as may be necessary;
- In respect of the Spectrum Fees for Premium Spectrum Bands, make recommendations to the Prime Minister and make any changes to the Fee Schedule as directed by the Prime Minister in accordance with section 93 of the Comms Act;
- Issue a Statement of Results responding to all comments and representations received to this Consultation Document.

Annex A – Proposed Fee Schedule

Table A-1: Station fees

Service	Description	Spectrum fee (per annum)
Aeronautical	Fixed Ground Station	\$300
Amateur	Radio Station	\$25
Experimental	Radio Station	\$100
Maritime	Ship Radio Station equipped with GMDSS	\$150
Satellite	Satellite terminals with dish size ≥ 3 metres	\$4,500
	Satellite terminals with dish size < 3 metres	\$500
Broadcast TV	Public service TV station	\$3,000

Notes: For aeronautical, amateur, experimental, maritime and broadcast TV services, fees are charged per station. For satellite services where terminals have dish sizes of 3 metres or more, fees are charged per station. For satellite services where terminals have dish sizes smaller than 3 metres (i.e. VSAT), fees are charged per system.

Table A-2: Schedule for bandwidth-related fees (annual fee in \$/MHz)

	Service	Cellular mobile	All other services		
	Island Factor	National	National/New Providence	Grand Bahama	Any other island
Frequency band factor	Up to 960 MHz	13,000	8,500	1,700	850
	960 MHz - 2200 MHz	6,500	4,250	850	425
	2.2 – 6.7 GHz	650	425	85	42.5
	6.7 – 30 GHz	130	85	17	8.5
	Above 30 GHz	65	42.5	8.5	4.25

Notes: The values in this table are calculated using the bandwidth-related fee formula $Fee = C * FBF * IF * TF * BW$, based on Time Factor (TF) of 1 and Bandwidth (BW) of 1 MHz. There is a minimum fee of \$100.

How to derive the annual fee payable using Table A-2:

- i. Look up the corresponding fee/MHz value for their service (cellular mobile or other services) based on the relevant Frequency Band Factor (row) and Island Factor (column) for their assigned spectrum.
- ii. Multiply this value by the Bandwidth assigned in MHz (e.g. if 2x25 kHz is assigned then the Bandwidth is 0.05MHz) and the Time Factor (if licence period is 1 calendar year, then $TF = 1$; if licence period is less than 1 calendar year, the TF will be scaled pro-rata to licence duration,

rounded up to the nearest month, i.e. if the licence period is 10 weeks, the fee will be calculated on the basis of 3 months, i.e. $TF = 0.25$).

Table A-3: URCA spectrum cost recovery fee

Calculation of cost recovery fee	21% of spectrum fee payable
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Note: The spectrum cost recovery fee is applicable to all spectrum licensees who are required to pay spectrum fees (both station and bandwidth-related fees).