



**The Supreme Council of Information and
Communications Technology “ictQATAR”**

Consultation Document

on

Radio Spectrum Fees

1 May 2013

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Table of Contents

1	Instructions for Responding to this Consultation	3
1.1	Consultation Procedures	3
1.2	Publication of Comments.....	3
2	Radio Spectrum Fees	4
2.1	Introduction	4
2.2	Current Fees	4
	2.2.1 Spectrum license fees	5
	2.2.2 Frequency license fees	5
2.3	Need to Change	5
3	Overview of Proposed Schedule of Radio Spectrum Fees	7
3.1	Introduction	7
3.2	Station License Fee.....	8
3.3	CB License Fee.....	8
3.4	Test and Development License Fee	9
3.5	Radio Spectrum License fee	9
	3.5.1 How to calculate the Radio Spectrum License Fee	12
	3.5.2 Coverage definitions	13
	3.5.3 Fees for radio spectrum above 40 GHz	14
	3.5.4 Fees for periods less than one calendar year	14
	3.5.5 Examples of Proposed Radio Spectrum License Fees	14
3.6	Implementation Schedule	16
	Annex A – Definitions	17
	Annex B – Proposed Schedule of Radio Spectrum Fees	20
	Annex C – Detailed Rationale Behind Proposed Radio Spectrum Fees	21
	Annex D – Summary of Consultation Questions	22

1 Instructions for Responding to this Consultation

1.1 Consultation Procedures

All interested parties are invited to submit responses to the questions asked and to provide their views on any other relevant aspects. Comments should reference the number of the question being addressed or the specific section of this document if not responding to a particular question.

ictQATAR asks that, to the extent possible, submissions be supported by examples or relevant evidence. Any submissions received in response to this consultation will be carefully considered by ictQATAR when preparing the final revised Instruction. Nothing included in this consultation document is final or binding. However, ictQATAR is under no obligation to adopt or implement any comments or proposals submitted.

Comments should be submitted by email to pharris@ict.gov.qa by June 23rd, 2013 at the latest. The subject reference in the email should be stated as "Radio Spectrum Fees". It is not necessary to provide a hard copy in addition to the soft copy sent by email.

1.2 Publication of Comments

In the interests of transparency and public accountability, ictQATAR intends to publish the submissions to this consultation on its website at www.ictqatar.qa. All submissions will be processed and treated as non-confidential unless confidential treatment of all or parts of a response has been requested.

In order to claim confidentiality for information in submissions that stakeholders regard as business secrets or otherwise confidential, stakeholders must provide a non-confidential version of such documents in which the information considered confidential is blacked out. This "blacked out" text should be contained in square brackets. From the non-confidential version it has to be clear where information has been deleted. To understand where redactions have been made, stakeholders must add indications such as "business secret", "confidential" or "confidential information".

A comprehensive justification must be provided for each and every part of the submission required to be treated as confidential. Furthermore, confidentiality cannot be claimed for the entire document or whole sections of the document as it is normally possible to protect confidential information with limited redactions.

While ictQATAR will endeavour to respect the wishes of respondents, in all instances the decision to publish responses in full, in part or not at all, remains at the sole discretion of ictQATAR. By making submissions to ictQATAR in this consultation, respondents will be deemed to have waived all copyright that may apply to intellectual property contained therein.

For more clarification concerning the consultation process, please contact Philip Harris, Licensing Section Manager, pharris@ict.gov.qa.

2 Radio Spectrum Fees

2.1 Introduction

The radio spectrum (spectrum) is a finite and valuable national resource, the management of which is vested in ictQATAR by the Telecommunications Law of 2006. Spectrum is vitally important to all sectors of the communications services industry, as well as to other strategic industries and non-commercial sectors.

A national licensing framework is required to ensure that access to radio spectrum is appropriately regulated. Idle spectrum is of little benefit to society and this framework must find a balance between the need to avoid harmful interference whilst, at the same time, making spectrum as widely available as possible to users and applications that depend on it. A separate consultation process has recently been undertaken by ictQATAR on the implementation of a new spectrum licensing regime for Qatar and ictQATAR expects to implement the changes arising from this process over the coming year.

Under the new spectrum licensing regime, access to spectrum in Qatar will be authorised either by means of an Individual Radio Spectrum License or a Class Radio Spectrum License. No fees will be payable when radio spectrum is used in accordance with a Class License, however, fees will be applied for the use of radio spectrum under Individual Radio Spectrum Licenses granted by ictQATAR and ictQATAR now wishes to consult on proposals for a new Schedule of Radio Spectrum Fees as described in this consultation document.

This consultation document consists of the following parts:

1. The core text in this document

The core text explains why it is necessary to introduce the Schedule of Spectrum Fees and provides a high-level description of the rationale behind the methodology adopted to determine the fees. This is then supported by numerous examples which enable the current and proposed fees for Radio Spectrum Licenses to be easily compared;

2. Annex A: Definitions

3. Annex B: The proposed Schedule of Radio Spectrum Fees

This document lists the spectrum fees that shall be payable and how they will be calculated. It is proposed that this document shall be published as a standalone document to communicate the fees; and

4. Annex C: A detailed explanation of the rationale behind the proposed fees

The development of a methodology for calculating Radio Spectrum Fees is a complicated exercise and it is recognised that not all readers will wish to study the detailed rationale behind the proposed Schedule of Radio Spectrum Fees. Thus the detailed explanation of the rationale behind the methodology adopted to determine these fees is attached as a self-contained report at Annex C to this document.

5. Annex D: Summary of Consultation Questions

ictQATAR intends to take justified comments and concerns of those parties who respond to this consultation into account before seeking approval of the ictQATAR Board of Directors to adopt and publish the Schedule of Radio Spectrum Fees.

2.2 Current Fees

Currently there are two categories of individual license which authorise spectrum use in Qatar. These are called spectrum licenses and frequency licenses.

Spectrum licenses: Authorise the use of spectrum for the provision of public telecommunications networks and services;

Frequency licenses: Authorise the use of spectrum for applications other than the provision of public telecommunications networks and services.

Note that under the new spectrum licensing regime, these two categories of license will be replaced by a single category of license called Radio Spectrum License.

2.2.1 Spectrum license fees

Fees for spectrum licenses are calculated according to a schedule included in public network spectrum licenses. These fees have not been modified since they were set in 2007 and are shown in Table 1 below.

Frequency range (MHz)	Annual Fee (QAR/MHz)
Below 800	23,660
800-1,900	18,200
1,900-3,000	14,560
3,000-5,000	10,920
5,000-10,000	5,460
10,000-20,000	1,820
20,000-35,000	1,456
above 35,000	546

Table 1: Current fees for spectrum licenses

2.2.2 Frequency license fees

Fees applied to frequency licenses are based mainly on the nature of use and amount of equipment. For equipment operating in international frequency bands (e.g. aeronautical, maritime or amateur stations), an annual fee per frequency or per equipment is applied, ranging from QAR 100 to QAR 500 depending on transmit power. Aircraft, ship and amateur stations are charged a flat rate fee of QAR 500, but large ships are also subject to fees for each item of radio equipment on board.

For equipment operating on nationally assigned frequencies the fee depends on the bandwidth assigned, with an upper limit of QAR 10,000 for bandwidths above 1 MHz. Special fees apply to satellite systems such as very small aperture terminals (VSATs) and satellite news gathering (SNG) stations. Certain receive only devices, such as paging receivers are also currently subject to a license fee¹.

These frequency license fees were set in 1987.

2.3 Need to Change

As demand for radio spectrum has grown, it has become increasingly important to ensure that all of the available radio spectrum is used in the most efficient and effective manner.

¹ Further details of frequency fees for specific applications can be found in the Public Consultation on Radio Spectrum Policy for the State of Qatar, published on 5th October 2010, tables 2.3 – 2.5 inclusive

Radio Spectrum Fees have become an important tool used by spectrum management organisations to encourage efficient use and discourage licensees from acquiring or retaining more spectrum than they actually need. However, neither the spectrum fees nor the frequency fees discussed above have been revised since they were first set (2007 and 1987 respectively) and therefore a fundamental review is overdue.

Widely recognised best practice requires that Radio Spectrum Fees should be set in a fair, objective and transparent manner and without incurring undue administrative costs.

- Transparency requires that the basis on which fees are set should be made clear, including the method for setting fees. *This is not entirely the case in Qatar. Current fees for spectrum licenses are included in the license, however fees for frequency licenses are not published.*
- Objectivity and fairness mean that fees should be based on objective factors and all license holders in a given frequency band should be treated on an equitable basis. *This is not currently the case in Qatar and in some instances the difference in fee paid by different users of the same band is a factor of 135 times.*
- Administrative simplicity, which could involve simply setting a flat fee payment, needs to be balanced against the requirement to encourage efficiency of spectrum use which may be promoted if fees are based on the amount of spectrum assigned, i.e. taking account of parameters such as bandwidth, frequency band or coverage. *This is not entirely the case in Qatar, frequency license fees are complicated to calculate and involve the number of radio terminals used by the licensee, with caps on the maximum number of terminals permitted in one license, resulting in multiple licenses being issued and additional fees being incurred where the number of terminals is large.*

The Telecommunications Law requires² that spectrum fees should be set to ensure the efficient use of spectrum taking account of international best practice. However, current practices of including the number of radio terminals in determining the frequency license fee undermines efficient use of spectrum as it penalises those users who are able to operate a large number of radios in a given amount of spectrum compared to those who operate fewer radios in the same amount of radio spectrum: The user operating more radios is using the spectrum more efficiently, yet they pay more than the less efficient user.

It is also widely accepted best practice that fees should reflect the level of demand for spectrum:

- In bands which are not constrained by supply, fees should be set at a level consistent with recovering the costs associated with licensing and managing the spectrum; and
- In frequency bands where demand exceeds the available spectrum, fees should be set higher than the cost of managing the spectrum in order to assist with managing demand and may be set to reflect, as far as practicable, the market value of the spectrum.

Revenue generated by spectrum and frequency license fees in 2012 amounted to QAR 25.5 million, of which QAR 11 million related to spectrum license fees and QAR 14.5 million to frequency license fees. Current fees in high demand bands tend to be low by international standards and fees in other bands are set at a level that is much higher than would be

² Article 4 (3) of the Telecommunications Law and Article 24 (4) of the Telecommunications By-Law.

required to recover spectrum management costs. Detailed benchmarking data to support this is provided in Annex C.

ictQATAR's Radio Spectrum Policy³ states that:

- All users of spectrum, apart from those specifically exempted or covered by class licenses (e.g. some users of short range devices), will pay fees for using spectrum that, at a minimum, recover ictQATAR's costs of managing the spectrum.
- License fees will, in general, reflect the opportunity cost⁴ of spectrum access in congested bands.
- To provide incentives for efficient spectrum use, spectrum fees will be related to:
 - the quantity of spectrum used (i.e. number of kHz or MHz), area sterilised⁵, degree of sharing or exclusivity and duration of use
 - the frequency band, with higher fees in the lower, typically more valuable bands.
- Principles for setting fees and the fees schedule will be published.
- Spectrum fees for frequency and spectrum licenses will be set on a consistent basis.

It is therefore apparent that the current method of determining fees for the use of spectrum is neither consistent with international best practices or ictQATAR's own Radio Spectrum Policy. The new method for calculating Radio Spectrum Fees proposed in this consultation document:

- Encourages the efficient and effective use of this scarce resource;
- Is non-discriminatory;
- Rebalances fees so that they more closely reflect the spectrum management costs or the value of the spectrum as appropriate; and
- Will be published.

Question 1.	Do you agree that spectrum fees should as a minimum cover the costs incurred by ictQATAR?
Question 2.	Do you agree with the principle that license fees in bands where demand for spectrum is likely to exceed the available supply should reflect the opportunity cost associated with using that spectrum?

3 Overview of Proposed Schedule of Radio Spectrum Fees

3.1 Introduction

The proposed Schedule of Radio Spectrum Fees presented in this document is intended to provide a transparent, objective and non-discriminatory basis for setting spectrum fees. It applies established best practices that have been adapted to the Qatari context. The

³ The Radio Spectrum Policy document can be downloaded from www.ictqatar.qa/en/documents/document/radio-spectrum-policy

⁴ The benefit that other users would have derived from using the radio spectrum which they have been denied

⁵ i.e. the size of the geographic area over which access to the licensed spectrum is denied to other users

proposed schedule also provides a unified approach to setting fees for the use of spectrum for different user types, thus removing the current discrepancy in spectrum fees arising between spectrum and frequency licenses.

The proposed Schedule of Radio Spectrum Fees proposes the following fee types:

- Station License Fee; and
- Radio Spectrum License Fee

Each of these fees is explained in this section.

3.2 Station License Fee

Station License Fees will apply where a license authorises access to a pool of radio frequencies that is designated internationally for the licensed use and that are intended to be shared by other holders of such licenses. Station License Fees will apply to:

- Amateur radio licenses;
- Aircraft station licenses; and
- Ship station licenses;

Station based fees will be set on a per station basis and will not be dependent on the number of radios or bandwidth of radio spectrum used.

The proposed fees for amateur, aircraft and ship licenses are shown in Table 2 below:

Station License	Description	Annual Fee
Amateur	Up to two call signs (excluding specific “vanity” call signs)	QAR 500
	Additional cost per call sign beyond first two, or for specific “vanity” call signs	QAR 100
Aircraft	Take-off weight up to 14,000 kg	QAR 500
	Take-off weight above 14,000 kg	QAR 2,000
Ship	Up to 300 gross tonnes	QAR 500
	300 gross tonnes or above	QAR 2,000

Table 2: Proposed fees for amateur, aeronautical and ship licenses

3.3 CB License Fee

The fee for a CB License will be QAR500 per annum and will not be dependent on the number of radios or bandwidth of radio spectrum used.

3.4 Test and Development License Fee

A Test and Development License will enable research and repair activities to be carried out under laboratory conditions and thus they are not associated with the operational use of radiocommunications equipment. It is proposed that a flat rate fee of QAR500 per annum shall be charged for each test and development site.

Question 3.	Do you consider the structuring of the CB, test and development, amateur, aircraft and ship station licenses to be appropriate? If no, please explain your reasons.
Question 4.	If yes, is the proposed size of the fees appropriate?

3.5 Radio Spectrum License fee

Radio Spectrum Licences, typically, authorise the use of radio spectrum on an exclusive basis. Such licenses afford the licensee protection from interference from other users of the radio spectrum. In addition, the new licensing regime being introduced includes a category of Radio Spectrum License for non-exclusive use and therefore does not provide protection from other users of radio spectrum who are also operating under such a license. However, this applies only to a limited number of bands allocated for fixed link use and, as will be seen later in this document, the proposed fees for such Radio Spectrum Licences are lower than the fees for a corresponding license offering protection.

An international benchmarking study conducted by ictQATAR showed that, in the interests of efficient spectrum use and avoidance of discrimination, the following parameters should be taken into account when setting the fees for Radio Spectrum Licences:

Frequency band used: Lower frequencies propagate further than higher frequencies making them more useful. However, the better propagation results in higher spectrum management costs in lower frequency bands due to the increased probability of interference and greater need for coordination (for example with neighbouring countries).

Frequencies between 9 kHz and 80 GHz are widely used for radiocommunications, however, the vast majority of radio users operate at frequencies below 3 GHz. Taking the frequency band into account in the fees calculation also allows fees to be set higher in bands where demand exceeds supply relative to bands where demand is lower.

Amount of spectrum licensed: The Radio Spectrum License fee should, for a given frequency band, be proportional to the amount of radio spectrum assigned to the user.

Coverage area: The larger the coverage area, the larger the area over which access to the licensed spectrum is denied to other users (sometimes referred to as the area “sterilised”). Similarly, smaller coverage areas allow radio spectrum to be re-used by other users in other areas. Therefore the larger the coverage area, the higher the Radio Spectrum License fee should be.

Duration of license: The longer the duration of use, the higher the fee should be. The default unit for Radio Spectrum Fees will be QAR per calendar year but there will be licenses where the duration may be less than one year and in such cases the fee shall be paid pro-rata for the licensed duration.

Question 5. Do you agree that, where practical, spectrum fees should be related to the frequency band used, quantity of spectrum licensed, coverage area and duration of use?

Annex C describes in detail the approach taken by ictQATAR to develop an algorithm that takes the above factors into account when calculating the annual Radio Spectrum License Fee.

Table 3 below shows the annual Radio Spectrum License Fee per MHz of assigned spectrum for different frequency bands, radio service types and coverage areas. These fees have been generated by applying the algorithm described in Annex C.

Annual Radio Spectrum License Fee in QAR/MHz ^{11,13}					
Frequency Range	Radio service	Individual fixed links and radars, beacons, navigation equipment and satellite services in exclusive bands ^{5,6,7}	Mobile services, point to multipoint fixed links, scanning telemetry / SCADA systems, broadband wireless access and broadcast transmitters		
	Coverage		Small Area	Local Area	Wide Area
	Coverage Area ^{1,2}		$A \leq 5 \text{ sqkm}$	$5 < A \leq 500 \text{ sqkm}$	$500 < A \leq 2,000 \text{ sqkm}$
	Max Coverage Radius ^{1,3}		$R \leq 1 \text{ km}$	$1 < R \leq 12.5 \text{ km}$	$12.5 < R \leq 25 \text{ km}$
	Transmitter, ERP ⁴		$ERP \leq 1 \text{ W}$	$1 < ERP \leq 5 \text{ W}$	$5 < ERP \leq 25 \text{ W}$
Frequency Range	Below 87.5 MHz	8,320	8,320	16,640	24,960
	87.5 - 108 MHz	33,333	33,333	66,667	100,000
	108 - 117.975 MHz	8,320	8,320	16,640	24,960
	117.975 - 137 MHz	33,333	33,333	66,667	100,000
	137 - 146 MHz	8,320	8,320	16,640	24,960
	146 - 174 MHz	33,333	33,333	66,667	100,000
	174 - 410 MHz	8,320	8,320	16,640	24,960
	410 - 430 MHz	33,333	33,333	66,667	100,000
	430 - 450 MHz	8,320	8,320	16,640	24,960
	450 - 470 MHz	33,333	33,333	66,667	100,000
	470 - 694 MHz	8,320	8,320	16,640	24,960
	694 - 960 MHz	33,333	33,333	66,667	100,000
	960 - 1710 MHz	2,080	2,080	4,160	6,240
	1710 - 2025 MHz	25,000	25,000	50,000	75,000
	2025 - 2110 MHz	2,080	2,080	4,160	6,240
	2110 - 2200 MHz	25,000	25,000	50,000	75,000
	2200 - 2400 MHz	1,040	1,040	2,080	3,120
	2400 - 2500 MHz ¹²	130	130	260	390
	2500 - 2690 MHz	13,333	13,333	26,667	40,000
	2690 - 5150 MHz	1,040	1,040	2,080	3,120
	5150 - 5350 MHz	130/1,040 ¹⁰	130	260	390
	5350 - 5470 MHz	1,040	1,040	2,080	3,120
	5470 - 5875 MHz	130/1,040 ¹⁰	130	260	390
	5875 - 10 GHz	520	520	1,040	1,560
	10 - 19.7 GHz	260	260	520	780
	19.7 - 40 GHz	130	130	260	390

Table 3: Proposed Radio Spectrum License Fees

Notes for Table 3:

1. Applies to area and band based licenses for PMR/TMR networks, cellular and FM broadcasting.
2. Applies to licenses where coverage is defined as a geographic area.
3. Applies to licenses where coverage is defined as a radius from a central point.
4. Applies to individually licensed aeronautical, maritime or PMR base stations.
5. For bidirectional fixed links, fees will take the bandwidth in both directions into account, i.e. a bidirectional fixed link with a 7 MHz assigned bandwidth will consist of two radio transmitters operating on different frequencies but both with a 7 MHz assigned bandwidth, thus the fee will be based on the combined assigned bandwidth of 14 MHz.
6. For fixed links, where two links are deployed along the same path using the same frequencies but with orthogonal polarisation, the fee for the second link will be reduced by 50%.
7. Exclusive satellite bands are those that are not also allocated on a primary basis to the terrestrial fixed service
8. Shared satellite bands are those that are also allocated on a primary basis to the terrestrial fixed service
9. Fees for point to point link block allocations will be set at the national coverage level.
10. The lower fee per MHz applies to non-protected fixed links operating in this frequency range.
11. Table 3 is not a statement of assignment policy, i.e. the presence of a fee in each cell does not indicate that a Radio Spectrum License can be obtained to operate any radio service in any frequency band.
12. All assignments in this band are granted on a shared and non-protected protected basis, this includes nation-wide assignments (i.e. nation-wide assignments are not exclusive to the licensee).
13. Fees may be subject to periodic review in the future.

3.5.1 How to calculate the Radio Spectrum License Fee

The Radio Spectrum License Fee is calculated by following the steps described below:

1. Identify the row in Table 3 showing the frequency range within which the assignment sits;
2. Move along the row to the column which matches the radio service and/or coverage.
3. The cell where the row and column intersect contains the cost of the assignment per MHz of assigned bandwidth. Therefore this figure should be multiplied by the assigned bandwidth in MHz to determine the annual fee. For example:

For an assignment at 435MHz with an ERP of 5W and an assigned bandwidth of 25 kHz (which may comprise either a single simplex 25 kHz frequency channel or a duplex pair of 12.5 kHz frequency channels):

Table 3 shows the annual cost per MHz is QAR16,640

Converting from kHz to MHz; 25 kHz = 0.025MHz

Thus the calculated annual fee for the assignment is; $16,640 \times 0.025 = \text{QAR}416$

4. If a Radio Spectrum License includes more than one assignment, then the individual fee for each assignment is calculated by following the above steps and the Radio

Spectrum License fee will be the sum of the fees for all assignments included in the license.

5. However, if the sum of the fees of all assignments is less than QAR 500, then a minimum fee of QAR 500 is applied as the Radio Spectrum License Fee.
6. Note that all fees will be rounded up to the nearest QAR 100, i.e. in the example given above the applied fee would be QAR 500 p.a.

Note: Receive only devices and radio transmitters that are covered by Class Licences will not be subject to Radio Spectrum Fees.

Question 6. Do you agree with the proposal to apply a minimum spectrum fee of QAR500 per annum to all Radio Spectrum Licences?

3.5.2 Coverage definitions

Table 3 includes three criteria that relate to coverage, these are:

1. Coverage area;
2. Coverage radius; and
3. Transmitter Effective Radiated Power (ERP)

Under the new spectrum licensing regime that ictQATAR has recently consulted on, there are different license types that have coverage defined in different ways; the notes to Table 3 reflect this. Therefore, it is not intended that an assignment must meet each of these coverage related criteria in order for the fees in the column to apply. Rather, it is intended that the fees in the column that match the coverage definition in the license shall be applied. The following are some examples:

1. If the Radio Spectrum License defines the authorised coverage in terms of the transmitter ERP, then the fee per MHz of assigned spectrum will be found in the column matching the authorised ERP, i.e. if the ERP of an assignment is equal to or less than 1W, then the fee per MHz will be found in the column labelled Small Area.
2. If the Radio Spectrum License defines the authorised coverage in terms of a maximum coverage radius, then the fee per MHz of assigned spectrum will be found in the column matching the authorised maximum coverage radius, i.e. if the maximum coverage radius of an assignment is equal to or less than 1km, then the fee per MHz will be found in the column labelled Small Area.
3. If the Radio Spectrum License defines the authorised coverage in terms of the coverage area, then the fee per MHz of assigned spectrum will be found in the column matching the authorised coverage area, i.e. if the coverage area of an assignment is equal to or less than 5km², then the fee per MHz will be found in the column labelled Small Area.
4. If the Radio Spectrum License authorises the use of a network of radio transmitters each with an ERP of 5W but specifies a coverage area of 1,000 km², then the column labelled 'Wide Area' shall be used to identify the fee per MHz rather than the column labelled 'Local Area' – this is because the license has coverage defined as an area (i.e. in km²).

Question 7. Do you agree with the above approach to taking coverage into account in calculating the Radio Spectrum Fee? If no, please explain your reasoning and suggest an alternative approach.

3.5.3 Fees for radio spectrum above 40 GHz

In order to encourage the use of frequency bands above 40 GHz, and as an exception to the above means of calculating the Radio Spectrum License Fee, a flat rate annual fee of QAR 500 is proposed for each radio system that is operated under a Radio Spectrum License in frequency bands above 40 GHz, i.e. the fee is QAR 500 per link, irrespective of the assigned bandwidth.

Question 8. Do you agree with the proposal to apply a flat rate spectrum fee of QAR500 per link to links operating above 40 GHz, irrespective of the bandwidth assigned? If no, please explain your reasoning.

3.5.4 Fees for periods less than one calendar year

Where a Radio Spectrum License is valid for a period of less than one calendar year, the annual fee will be scaled pro-rata to the license duration, rounded up to the nearest month, i.e. if the licensed period is 6 weeks, the fee will be calculated on the basis of a duration of 2 months, which will be one sixth of the annual fee.

Where Radio Spectrum Licences are valid for a period of one year or more, the license fee will be paid annually in advance. If a license is cancelled before the end of the calendar year, a pro-rata refund will be paid corresponding to the remaining period for which fees have been paid. The refund will be calculated from the end of the month in which the license is cancelled, for example if the annual fee for the period 1st January to 31st December has been paid and the frequency license is cancelled on 2nd October, then two twelfths of the annual fee will be refunded, subject to the amount paid for the 10 months being equal to or exceeding the minimum annual fee. Should this not be the case, then the refund will be calculated by subtracting the minimum fee from the amount paid, the remainder will be credited to the licensee.

Question 9. Do you agree with the proposed approach to calculating Radio Spectrum License Fees for a period of less than one year? If no, please explain your reasoning and suggest an alternative approach.

3.5.5 Examples of Proposed Radio Spectrum License Fees

Table 4 below provides comparisons between the current fees and those that would apply under the proposed fees regime for a number of typical scenarios per calendar year. Note

that the comparisons are intended to be illustrative and fees may be subject to further revision in the light of this consultation.

License Type	Description	Current Fee	Proposed Fee
Hunting license, 440 MHz	Single radio, 12.5 kHz, 50 W ERP	QAR 350	QAR 700
VHF marine base station network, 160 MHz	6 base stations, each licensed to operate on 7 paired 12.5 kHz frequencies, all within an area of radius 25 km or less	QAR 31,800	QAR 17,500
On-site PMR network, 460 MHz	2 base stations, 20 mobiles, 4 paired 12.5 kHz frequencies, coverage radius less than 1 km	QAR 15,400	QAR 3,400
Large private trunked radio network, 420 MHz	30 base stations, 3,000 mobiles, 17 paired 12.5 kHz frequencies, coverage radius > 25 km	QAR 364,300	QAR 85,000
National Public TETRA network, 420 MHz	Block allocation of 2x5 MHz	QAR 236,600	QAR 2,000,000
National Cellular Network	Block allocations in 900 MHz (2x11.2 MHz), 1800 MHz (2x19.8 MHz) and 2 GHz bands (2x15 MHz) - spectrum not acquired at auction	QAR 1,565,200	QAR 14,920,000
National Cellular Network	Block allocations in 900 MHz (2x11.2 MHz), 1800 MHz (2x19.8 MHz) and 2 GHz bands (2x15 MHz) - spectrum acquired at auction	QAR 1,565,200	QAR 1,427,712
Point to point fixed link (individual link)	Individual bidirectional point to point link – 7 GHz band, 2 x 28 MHz	QAR 20,000	QAR 29,120
Point to point fixed link (individual link)	Individual bidirectional point to point link – 7 GHz band, 2 x 7 MHz	QAR 20,000	QAR 7,280
Point to point links (block allocation)	Block allocation of 2 x 28 MHz in 7 GHz band	QAR 305,760	QAR 174,720
Point to point link, transportable and used for outside broadcast backhaul	Unidirectional 7 GHz link, 30 MHz, deployable anywhere in State of Qatar	QAR 10,000	QAR 93,600
Broadcasting	High power FM broadcast transmitter (national coverage)	QAR 3,000	QAR 60,000

Table 4: Proposed Radio Spectrum License Fees

Question 10. Do you have a view on the levels of Radio Spectrum License Fees? Please explain the reasons for any views that you express.

3.6 Implementation Schedule

It is proposed that the proposed Schedule of Radio Spectrum Fees shall take effect on 1 January 2014.

It is also proposed that the Schedule of Radio Spectrum Fees should be reviewed every five years and that users should be given 12 months' notice of any future changes to the Schedule of Radio Spectrum Fees.

Question 11. Do you agree with the proposal to introduce the new fees from 1st January 2014 and to provide 12 months' notice of future changes to the Schedule of Radio Spectrum Fees?

Question 12. Do you agree with the proposal to review the Schedule of Radio Spectrum Fees at five year intervals?

Annex A – Definitions

The terms and expressions listed below shall be defined as follows unless the specific context requires otherwise, in line with the Applicable Regulatory Framework. All other terms used in the document shall have the meaning defined in the Applicable Regulatory Framework.

Air Traffic Control: Information, advisory control and emergency alerting services to prevent collisions between aircrafts in the air, between aircrafts and between aircrafts and other objects in apron / manoeuvring areas on the ground.

Allocation of radio spectrum: entry in the national frequency allocation table of a given frequency band for the purpose of its use by one or more terrestrial or space radio-communications services or the radio astronomy service under specified conditions.

Assignment of a radio frequency or radio frequency channel: authorization given by the General Secretariat for a radio station to use a radio frequency or radio frequency channel under specified conditions.

Authorization: an approval granted to use radio spectrum or provide telecommunications services.

Base Value (BV): The financial value in Qatari Riyals of a unit of radio spectrum (1 MHz), used in the calculation of Radio Spectrum License Fees.

Broadcasting Service: the broadcasting of radio and television programming to the public free of charge or for payment, by subscription or any other basis using any type of telecommunications network.

By-Law: The Executive By-Law of the Telecommunications Law.

Class License (Radio Spectrum): A license that defines the terms and conditions for the use of a specified frequency band where there is no requirement for individual licensing because there is a low risk of interference.

Coverage Factor (CF): The parameter used to represent extent of coverage, used in the calculation of Radio Spectrum License Fees.

Effective Radiated Power (ERP): A measure of the power of a radio transmission that takes into account the transmitter power, the antenna gain and losses in the system.

Frequency Band: a contiguous block of the radio spectrum which starts at one frequency and ends at another.

Frequency Band Factor (FBF): The parameter used to represent the relative value of different radio spectrum bands, used in the calculation of Radio Spectrum License Fees.

General Secretariat: The General Secretariat of the Supreme Council.

GMDSS: The Global Maritime Distress and Safety System (GMDSS) is an internationally agreed-upon set of safety procedures, types of equipment, and communication protocols used to increase safety and make it easier to rescue distressed ships, boats and aircraft.

ictQATAR: The regulator in Qatar established under Emiree decree Law No. 36 for 2004 and as further defined in Emiree decree Law No. 34 of 2006.

Industry, Scientific and medical (ISM): One or more Frequency Bands allocated to industrial, scientific and medical applications.

International ship / vessel: Maritime vessels that will operate in international waters.

Large Vessels: Vessels with 300 gross tonnage or more

Law: The Telecommunications Law issued by Decree Law No. (34) of 2006.

License: The permission issued by the Board or the General Secretariat to an individual or class of individuals to own or operate a telecommunications network, provide telecommunications services, or use radio frequency spectrum and it does not constitute a contract or bilateral agreement.

Licensee: A person who holds a License pursuant to the provisions of the Telecom Law and the executive by-law.

Maritime portable radio equipment: A license which authorises the use of a handheld VHF radio with an integral antenna and power supply.

Mesh network: A network where multiple points are linked to multiple other points to form a mesh.

National Frequency Allocation Plan: A component of the National Radio Spectrum Plan which provides specific allocation policies and information on the availability of spectrum for particular applications.

National Radio Spectrum Plan: The plan established for allocation and use of radio spectrum by the concerned entities.

National Regulatory Framework: Defines the national framework for the regulation of telecommunication networks and services.

Non-SOLAS Ship/Vessel: A ship or a Vessel that sail only in sea area A1 and is not required to comply with GMDSS radio carriage requirements E.g. Pleasure (non-commercial) boats, small fishing vessels etc.

Opportunity Cost Factor (OCF): The parameter used to administratively determine the market value of Frequency Bands used in the calculation of Radio Spectrum License Fees.

Point to multipoint links: a radiocommunication service between a particular fixed point and multiple other fixed points.

Point to point link: a radiocommunication service between particular fixed points.

Portable radio equipment: Portable radio equipment is defined as a handheld portable VHF or VHF/DSC radio transceiver with an integral antenna and power supply which is not designed to be permanently installed on a vessel or aircraft.

Radar: Radar uses radio waves to determine the range, altitude, direction, or speed of objects such as aircraft ships etc. It works by transmitting pulses of radio waves which are bounced off objects and the returned signal is used to calculate the required information about the object.

Radio beacons: Radio beacons transmit signals which are received by radio direction finding systems and are used to determine the location of a ship, aircraft or other vehicle.

Radio-communications: any transmission, emission or reception of signs, signals, writing, images, sounds, data or information of any kind by means of electromagnetic waves in the radio spectrum.

Radio Spectrum: Radio frequencies that are capable of being used in radio communication in accordance with the publications of the International Telecommunications Union.

Radio Spectrum License: The License to use radio spectrum in accordance with the plan, allocations, assignments and terms as stated in Chapter Four of the Law.

Schedule of Radio Spectrum Fees: Document that provides information on the annual license fees and license application fees that apply to the different radio spectrum licenses.

Secretary General: The Secretary General of the Supreme Council.

Service Provider: a person that is licensed to provide one or more telecommunications services to the public or licensed to own, establish or operate a telecommunications network to provide telecommunications services to the public. This includes providers of information or content provided using a telecommunications network.

Supervisory Control and Data Acquisition (SCADA): Radio communications technology used in controlling and monitoring equipment and processes.

Supreme Council: The Supreme Council for Information and Communications Technology-“ictQATAR.”

Time Factor (TF): The parameter used to represent the duration of a license, used in the calculation of Radio Spectrum License Fees.

The Telecommunications Law: The official Telecommunications law defined in the Emiree decree Law No. 34 of 2006.

Very Small Aperture Terminal (VSAT): Fixed satellite ground station or a stabilised maritime station using dish sizes no greater than 3m in diameter.

Annex B – Proposed Schedule of Radio Spectrum Fees



The Supreme Council of Information and Communications Technology “ictQATAR”

Annex B to Consultation on Radio Spectrum Fees

Draft Regulation No. 1 of 2013

On the

Schedule of Radio Spectrum Fees

Please note:

This is a draft Schedule of Radio Spectrum Fees. It will be updated as necessary following the consultation and then presented to the Board of ictQATAR for approval.

Issued: XX YYYY 2013

ICTRA EL/2013/05/01-Ab

Table of Contents

1	Introduction.....	3
1.1	Scope.....	3
1.2	Legal Framework	3
2	Schedule of Radio Spectrum Fees	4
2.1	General	4
2.2	Station License Fees.....	4
2.4	Test and Development Licence Fee	4
2.5	Radio Spectrum License Fee	4
	2.5.1 How to calculate the Radio Spectrum License Fee	6
	2.5.2 Coverage definitions	7
	2.5.3 Fees for radio spectrum above 40 GHz.....	7
2.6	Fees for periods less than one calendar year	8
2.7	Refunds for fees paid	8
2.8	Fees payment	8
2.9	Implementation schedule.....	8
	Annex A – Definitions	9

1 Introduction

1.1 Scope

This Regulation specifies the fees that are payable in connection with radio spectrum use in the State of Qatar and has been approved by the ictQATAR Board of Directors by virtue of Board Resolution No. [xx] of [date].

1.2 Legal Framework

According to Article 20 of Decree Law No. 36 of 2004, Establishing the Supreme Council for Communications and Information Technology (ictQATAR), sources of ictQATAR funding shall include monies realised from its activities.

Decree Law No. 34 of 2006 on the promulgation of the Telecommunications Law makes the following relevant provisions:

- Article 3: The Board of ictQATAR shall have the power and authority to determine the fees for the use of radio spectrum; and
- Article 4: The General Secretariat of ictQATAR shall have the authority and power to grant, amend, renew, suspend and revoke radio spectrum licenses.

Further provisions relevant to radio spectrum fees are included in Chapter 3 of the Decision of the Board of the Supreme Council of Information and Communications Technology No. 1 of 2009 on the promulgation of the Executive By-Law for the Telecommunications Law. In particular, Article 43 in Chapter 3 states:

- Any regulations, decisions and orders issued pertaining to fees shall contain the following principles:
 1. Stipulate the entity to which the fees and charges shall be paid.
 2. Fees and charges shall be levied on Licensees in an impartial manner.
 3. Fees and charges may be based on factors such as the amount of radio frequency spectrum provided in the License; whether the Licensee is operating in a shared or exclusive frequency band; or a percentage or proportion of the revenues of Licensees from the use of radio spectrum.
 4. Fees and charges payable under the Law and this By-Law are in addition to any other fees or charges that must be paid by Service Providers in connection with their operations or commercial activities.

This document sets out the spectrum licensing related fees from which ictQATAR will derive its revenue as foreseen in the above legal provisions.

2 Schedule of Radio Spectrum Fees

2.1 General

No fees are payable at the time of application, however, all fees due must be paid prior to the associated license being granted.

Fees for licenses that have a term longer than one calendar year shall be paid annually in advance (i.e. shall be paid before 1 January of each year).

A refund may be payable in the event that a license is cancelled by the licensee. Any such refund will be calculated in accordance with section 2.7 of this Schedule of Fees.

2.2 Station License Fees

The annual fees for amateur, aircraft and ship station licenses are shown in Table 1 below:

Station License	Description	Annual Fee
Amateur	Up to two call signs	QAR 500
	Additional cost per call sign beyond first two	QAR 100
Aircraft	Take-off weight up to 14,000 kg	QAR 500
	Take-off weight above 14,000 kg	QAR 2,000
Ship	Up to 300 gross tonnes	QAR 500
	300 gross tonnes or above	QAR 2,000

Table 1: Annual fees for amateur, aeronautical and ship station licenses

2.3 CB Licence Fee

The fee for a CB Licence will be QAR500 per annum.

2.4 Test and Development Licence Fee

The fee for a Test and Development Licence shall be QAR500 per annum for each test and development site.

2.5 Radio Spectrum License Fee

The annual Radio Spectrum License Fee, expressed as QAR per MHz of assigned spectrum, is shown in Table 2 below.

Annual Radio Spectrum Licence Fee in QAR/MHz ^{11,13}						
Frequency Range	Radio service	Individual fixed links and radars, beacons, navigation equipment and satellite services in exclusive bands ^{5,6,7}	Mobile services, point to multipoint fixed links, scanning telemetry / SCADA systems, broadband wireless access and broadcast transmitters			Any frequency licence with exclusive nation-wide use and satellite services in shared bands ^{8,9}
	Coverage		Small Area	Local Area	Wide Area	National
	Coverage Area ^{1,2}		$A \leq 5 \text{ sqkm}$	$5 < A \leq 500 \text{ sqkm}$	$500 < A \leq 2,000 \text{ sqkm}$	$A > 2,000 \text{ sqkm}$
	Max Coverage Radius ^{1,3}		$R \leq 1 \text{ km}$	$1 < R \leq 12.5 \text{ km}$	$12.5 < R \leq 25 \text{ km}$	$R > 25 \text{ km}$
	Transmitter, ERP ⁴		$ERP \leq 1 \text{ W}$	$1 < ERP \leq 5 \text{ W}$	$5 < ERP \leq 25 \text{ W}$	$ERP > 25 \text{ W}$
Frequency Range	Below 87.5 MHz	8,320	8,320	16,640	24,960	49,920
	87.5 - 108 MHz	33,333	33,333	66,667	100,000	200,000
	108 - 117.975 MHz	8,320	8,320	16,640	24,960	49,920
	117.975 - 137 MHz	33,333	33,333	66,667	100,000	200,000
	137 - 146 MHz	8,320	8,320	16,640	24,960	49,920
	146 - 174 MHz	33,333	33,333	66,667	100,000	200,000
	174 - 410 MHz	8,320	8,320	16,640	24,960	49,920
	410 - 430 MHz	33,333	33,333	66,667	100,000	200,000
	430 - 450 MHz	8,320	8,320	16,640	24,960	49,920
	450 - 470 MHz	33,333	33,333	66,667	100,000	200,000
	470 - 694 MHz	8,320	8,320	16,640	24,960	49,920
	694 - 960 MHz	33,333	33,333	66,667	100,000	200,000
	960 - 1710 MHz	2,080	2,080	4,160	6,240	12,480
	1710 - 2025 MHz	25,000	25,000	50,000	75,000	150,000
	2025 - 2110 MHz	2,080	2,080	4,160	6,240	12,480
	2110 - 2200 MHz	25,000	25,000	50,000	75,000	150,000
	2200 - 2400 MHz	1,040	1,040	2,080	3,120	6,240
	2400 - 2500 MHz ¹²	130	130	260	390	780
	2500 - 2690 MHz	13,333	13,333	26,667	40,000	80,000
	2690 - 5150 MHz	1,040	1,040	2,080	3,120	6,240
	5150 - 5350 MHz	130/1,040 ¹⁰	130	260	390	780
	5350 – 5470 MHz	1,040	1,040	2,080	3,120	6,240
	5470 - 5875 MHz	130/1,040 ¹⁰	130	260	390	780
	5875 - 10 GHz	520	520	1,040	1,560	3,120
	10 - 19.7 GHz	260	260	520	780	1,560
	19.7 - 40 GHz	130	130	260	390	780

Table 2: Radio Spectrum License Fees

Notes for Table 2:

1. Applies to area and band based licenses for PMR/TMR networks, cellular and FM broadcasting.
2. Applies to licenses where coverage is defined as a geographic area.
3. Applies to licenses where coverage is defined as a radius from a central point.
4. Applies to individually licensed aeronautical, maritime or PMR base stations.
5. For bidirectional fixed links, fees will take the bandwidth in both directions into account, i.e. a bidirectional fixed link with a 7 MHz assigned bandwidth will consist of two radio transmitters operating on different frequencies and both with a 7 MHz assigned bandwidth, thus the fee will be based on the combined assigned bandwidth of 14 MHz.
6. For fixed links, where two links are deployed along the same path using the same frequencies but with orthogonal polarisation, the fee for the second link will be reduced by 50%.
7. Exclusive satellite bands are those that are not also allocated on a primary basis to the terrestrial fixed service
8. Shared satellite bands are those that are also allocated on a primary basis to the terrestrial fixed service
9. Fees for point to point link block allocations will be set at the national coverage level.
10. The lower fee per MHz applies to non-protected fixed links operating in this frequency range.
11. Table 2 is not a statement of assignment policy, i.e. the presence of a fee in each cell does not indicate that a Radio Spectrum License can be obtained to operate any radio service in any frequency band.
12. All assignments in this band are granted on a shared and non-protected protected basis, this includes nation-wide assignments (i.e. nation-wide assignments are not exclusive to the licensee).
13. Fees may be subject to periodic review in the future.

2.5.1 How to calculate the Radio Spectrum License Fee

The Radio Spectrum License Fee is calculated by following the steps described below:

1. Identify the row in Table 2 showing the frequency range within which the assignment is located;
2. Move along the row to the column which matches the radio service and/or coverage required (note coverage can be specified in a number of ways – see notes 1, 2, 3 and 4 above and the section on coverage definitions below).
3. The cell where the row and column intersect contains the cost of the assignment per MHz of assigned bandwidth. Therefore this figure should be multiplied by the assigned bandwidth in MHz to determine the annual fee. For example:

For an assignment at 435MHz with an ERP of 5W and an assigned bandwidth of 12.5kHz, Table 2 shows the annual cost per MHz is QAR16,640
Converting the assigned bandwidth from kHz to MHz; $12.5\text{kHz} = 0.0125\text{MHz}$
Thus the annual fee for the assignment is; $16,640 \times 0.0125 = \underline{\text{QAR208}}$

4. If a Radio Spectrum License includes more than one assignment, then the individual fee for each assignment is calculated by following the above steps and the annual

Radio Spectrum License Fee will be the sum of the costs of all assignments included in the license.

5. However, if the sum of the costs of all assignments is less than QAR 500, then a minimum fee of QAR 500 is applied as the annual Radio Spectrum License Fee.

A refund may be payable in the event that a Radio Spectrum License is cancelled by the licensee. Any such refund would be calculated in accordance with section 2.7 of this Schedule of Fees.

Note: Receive only devices and radio transmitters that are covered by Class Licenses will not be subject to Radio Spectrum Fees.

2.5.2 Coverage definitions

Table 2 includes three criteria that relate to coverage, these are:

1. Coverage area;
2. Coverage radius; and
3. Transmitter Effective Radiated Power (ERP)

Different license types have coverage defined in different ways; the notes to Table 2 reflect this. Therefore, it is not intended that an assignment must meet each of these coverage related criteria in order for the fees in the column to apply. Rather, it is intended that the column with the coverage criteria that matches the license should be identified and the column used to determine the fee for each assignment included in the license. The following are some examples:

1. If the Radio Spectrum Licence defines the authorised coverage in terms of the transmitter ERP, then the fee per MHz of assigned spectrum will be found in the column matching the authorised ERP, i.e. if the ERP of an assignment is equal to or less than 1W, then the fee per MHz will be found in the column labelled Small Area.
2. If the Radio Spectrum Licence defines the authorised coverage in terms of a maximum coverage radius, then the fee per MHz of assigned spectrum will be found in the column matching the authorised maximum coverage radius, i.e. if the maximum coverage radius of an assignment is equal to or less than 1km, then the fee per MHz will be found in the column labelled Small Area.
3. If the Radio Spectrum Licence defines the authorised coverage in terms of the coverage area, then the fee per MHz of assigned spectrum will be found in the column matching the authorised coverage area, i.e. if the coverage area of an assignment is equal to or less than 5km², then the fee per MHz will be found in the column labelled Small Area.

2.5.3 Fees for radio spectrum above 40 GHz

The annual Radio Spectrum License Fee for a radio system (for example, a bidirectional or unidirectional fixed link) operating above 40 GHz is QAR500.

This fee applies to each radio system that is operated under a Radio Spectrum License in frequency bands above 40 GHz, i.e. the fee for a fixed link operating above 40 GHz is QAR500 per link, irrespective of the assigned bandwidth.

2.6 Fees for periods less than one calendar year

For Radio Spectrum Licenses that are valid for a period of less than one calendar year, the annual fee will be scaled pro-rata to the license duration, rounded up to the nearest month, i.e. if the licensed period is 6 weeks, the fee will be calculated on the basis of a duration of 2 months, which will be one sixth of the annual fee. A minimum fee of QAR250 shall apply to such Licenses.

2.7 Refunds for fees paid

For Radio Spectrum Licenses that have a term of one year or more, the license fee will be paid annually in advance. If a license is cancelled before the end of the calendar year, a pro-rata refund will be paid according to the remaining period for which fees have been paid. The refund will be calculated from the end of the month in which the license is cancelled, for example if the annual fee for the period 1st January to 31st December has been paid and the frequency license is cancelled on 2nd October, then two twelfths of the annual fee will be refunded, subject to the amount paid for the 10 months being equal to or exceeding the minimum annual fee. Should this not be the case, then the refund will be calculated by subtracting the minimum fee from the amount paid, the remainder will be credited to the licensee.

2.8 Fees payment

Fees shall be paid into ictQATAR at the following bank account:

[The details of the ictQATAR bank account for receipt of spectrum fees will be included here.]

2.9 Implementation schedule

This Schedule of Radio Spectrum Fees shall take effect on 1 January 2014 and shall remain in effect until superseded by a later published version.

Annex A – Definitions

The terms and expressions listed below shall be defined as follows unless the specific context requires otherwise, in line with the Applicable Regulatory Framework. All other terms used in the document shall have the meaning defined in the Applicable Regulatory Framework.

Aircraft Station: A license that authorizes the licensee to establish and use radiocommunications equipment on board aircraft in specified aeronautical bands and in accordance with technical parameters specified in the license.

Amateur Station: A license that authorizes the licensee to establish and use radiocommunications equipment in restricted specified bands and in accordance with technical parameters specified in the license.

Assignment of a radio frequency or radio frequency channel: Authorization given by the General Secretariat for a radio station to use a radio frequency or radio frequency channel under specified conditions.

Authorization: An approval granted to use radio spectrum or provide telecommunications services.

Broadcasting Service: The broadcasting of radio and television programming to the public free of charge or for payment, by subscription or any other basis using any type of telecommunications network.

By-Law: The Executive By-Law of the Telecommunications Law.

Class License (Radio Spectrum): A license that defines the terms and conditions for the use of a specified frequency band where there is no requirement for individual licensing because there is a low risk of interference.

Coverage Factor (CF): The parameter used to represent extent of coverage, used in the calculation of Radio Spectrum License Fees.

Effective Radiated Power (ERP): A measure of the power of a radio transmission that takes into account the transmitter power, the antenna gain and losses in the system.

Frequency Band: A contiguous block of the radio spectrum which starts at a frequency and ends at another.

Frequency Band Factor (FBF): The parameter used to represent the relative value of different radio spectrum bands, used in the calculation of Radio Spectrum License Fees.

General Secretariat: The General Secretariat of the Supreme Council.

GMDSS: The Global Maritime Distress and Safety System (GMDSS) is an internationally agreed-upon set of safety procedures, types of equipment, and communication protocols used to increase safety and make it easier to rescue distressed ships, boats and aircraft

ictQATAR: The regulator in Qatar established under Emiree decree Law No. 36 for 2004 and as further defined in Emiree decree Law No. 34 of 2006.

Industry, Scientific and medical (ISM): One or more Frequency Bands allocated to industrial, scientific and medical applications.

International ship / vessel: Maritime vessels that will operate in international waters

Large Vessels: Vessels with 300 gross tonnage or more

Law: The Telecommunications Law issued by Decree Law No. (34) of 2006.

License: The permission issued by the Board or the General Secretariat to an individual or class of individuals to own or operate a telecommunications network, provide telecommunications services, or use radio frequency spectrum and it does not constitute a contract or bilateral agreement.

Licensee: A person who holds a License pursuant to the provisions of the Telecom Law and the executive by-law.

License Application: An application to ictQATAR for the grant of either a Station License or a Radio Spectrum License.

License Modification: An application to ictQATAR to modify one or more parameters of an existing Station License or a Radio Spectrum License.

Maritime Station: A license that authorizes the licensee to establish and use radiocommunications equipment on board maritime vessels in specified maritime bands and in accordance with technical parameters specified in the license.

National Radio Spectrum Plan: The plan established for allocation and use of radio spectrum by the concerned entities.

Non-SOLAS Ship/Vessel: A ship or a Vessel that sail only in sea area A1 and is not required to comply with GMDSS radio carriage requirements E.g. Pleasure (non-commercial) boats, small fishing vessels etc,

Opportunity Cost Factor (OCF): The parameter used to administratively determine the market value of Frequency Bands, used in the calculation of Radio Spectrum License Fees.

Point to point link: a radiocommunication service between particular fixed points

Radar: Radar uses radio waves to determine the range, altitude, direction, or speed of objects such as aircraft ships etc. It works by transmitting pulses of radio waves which are bounced off objects and the returned signal is used to calculate the required information about the object.

Radio beacons: Radio beacons transmit signals which are received by radio direction finding systems and are used to determine the location of a ship, aircraft or other vehicle

Radio-communications: any transmission, emission or reception of signs, signals, writing, images, sounds, data or information of any kind by means of electromagnetic waves in the radio spectrum.

Radio Spectrum: Radio frequencies that are capable of being used in radio communication in accordance with the publications of the International Telecommunications Union.

Radio Spectrum License: The License to use radio spectrum in accordance with the plan, allocations, assignments and terms as stated in Chapter Four of the Law.

Schedule of Radio Spectrum Fees: Document that provides information on the annual license fees and license application fees that apply to the different radio spectrum licenses.

Secretary General: The Secretary General of the Supreme Council.

Station License: A license granted by ictQATAR to operator an Amateur

Supervisory Control and Data Acquisition (SCADA): Radio communications technology used in controlling and monitoring equipment and processes.

Supreme Council: The Supreme Council for Information and Communications Technology-“ictQATAR.”

The Telecommunications Law: The official Telecommunications law defined in the Emiree decree Law No. 34 of 2006.

Very Small Aperture Terminal (VSAT): Fixed satellite ground station or a stabilised maritime station using dish sizes no greater than 3m in diameter.

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Annex C – Detailed Rationale Behind Proposed Radio Spectrum Fees



The Supreme Council of Information and Communications Technology “ictQATAR”

Annex C to Consultation on Radio Spectrum Fees

Detailed Rationale for the Proposed Radio Spectrum Fees

26 February 2013
ICTRA EL/2013/05/01-Ac

Table of Contents

1	Introduction.....	3
1.1	Scope.....	3
1.2	Background.....	3
1.3	Once-off and recurring fees.....	4
1.4	Annual License Fees.....	4
	1.4.1 Efficient spectrum use and best practice	4
	1.4.2 Proposed approach	5
2	Flat rate annual Radio Spectrum License Fees	7
2.1	Aircraft and Ship Station Licenses	7
	2.1.1 Proposed fees for aircraft station licenses	7
	2.1.2 Proposed fees for ship station licenses	7
2.2	Amateur Licenses	8
2.3	Fees for test and development licenses	8
2.4	Fees for individually licensed equipment operating at frequencies above 40 GHz	9
3	Fees for individual assignments in frequency bands below 40 GHz	9
3.1	Introduction	9
3.2	Setting the Frequency Band Factor (FBF)	10
3.3	Setting the Coverage Factor (CF).....	12
	3.3.1 Introduction	12
	3.3.2 Setting the Coverage Factor for specific services.....	13
3.4	The time factor (TF).....	18
3.5	Determining the base value per MHz (BV)	18
4	The level of fees in congested bands.....	19
4.1	Identification of congested bands	19
4.2	Basis for opportunity cost fees	21
	4.2.1 Fees in congested bands harmonised for public mobile/BWA services.....	21
4.3	Fees in other congested bands	22
	4.3.1 FM radio.....	22
	4.3.2 Fees for PMR in the VHF and UHF bands.....	24
	4.3.3 Fees for the VHF aeronautical and maritime mobile communication bands	25

1 Introduction

1.1 Scope

This document has been prepared to provide background information on the rationale behind the establishment of a Schedule of Radio Spectrum Fees. This document:

- Provides an overview of established international best practices for radio spectrum License Fees;
- Defines the scope of fees to be included in the Schedule of Radio Spectrum Fees;
- Introduces and explains the methodology to be used to determine Radio Spectrum Fees for different types of radio use in different bands; and
- Seeks the reader's views on specific aspects of fees setting by raising questions which the reader may respond to as part of the consultation on the proposed Schedule of Radio Spectrum Fees.

1.2 Background

Widely recognised best practice requires that license fees should be set in a fair, objective and transparent manner and without incurring undue administrative costs.

- Transparency requires that the basis on which fees are set should be made clear, including the method for setting fees.
- Objectivity and fairness mean that fees should be based on objective factors and all license holders in a given frequency band should be treated on an equitable basis. This should preclude, for example, different treatment of different types of users in a given frequency band.
- Administrative simplicity, which could involve simply setting a flat fee payment, needs to be balanced against the requirement to encourage efficiency of spectrum use which may be promoted if fees are based on the amount of spectrum assigned, i.e. taking account of parameters such as bandwidth, frequency band or coverage.

ictQATAR's Radio Spectrum Policy¹ establishes the following policy elements with respect to spectrum fees:

- All users of spectrum, apart from those specifically exempted or covered by class licenses (e.g. some users of short range devices), will pay fees for using spectrum that, at a minimum, recover ictQATAR's costs of managing the spectrum.
- License fees will, in general, reflect the opportunity cost of spectrum access in congested bands.
- To provide incentives for efficient spectrum use, spectrum fees will be related to:
 - the quantity of spectrum used (i.e. number of kHz or MHz), area sterilised², degree of sharing or exclusivity and duration of use

¹ The Radio Spectrum Policy document can be downloaded from www.ictqatar.qa/en/documents/document/radio-spectrum-policy

- the frequency band, with higher fees in the lower, typically more valuable bands.
- Principles for setting fees and the fees schedule will be published.
- Spectrum fees for frequency and spectrum licenses will be set on a consistent basis.

The principles described above underpin the proposed Schedule of Radio Spectrum Fees. The rationale presented in this document reflects best practice policy on spectrum fee structures and levels, and is based on international benchmarking and an assessment of the implications of the policy recommendations for individual licensees.

1.3 Once-off and recurring fees

The costs associated with issuing and maintaining Radio Spectrum Licenses fall into two distinct categories, namely:

- i) the administrative costs associated with issuing the license and any subsequent modifications that are requested, and
- ii) on-going spectrum management costs, such as interference monitoring, international co-ordination and enforcement of license conditions.

Administrative costs are largely independent of the amount of spectrum assigned to the licensee, whereas spectrum management costs are likely to be higher for larger amounts of spectrum and in lower frequency bands, since both give rise to a greater probability of interference.

It is proposed that, in order to avoid excessive administrative burden there will be no fixed application fees and that a recurring annual fee will be applied to cover ictQATAR's on-going spectrum management costs and to reflect any opportunity cost associated with a particular frequency band.

1.4 Annual License Fees

1.4.1 Efficient spectrum use and best practice

The Telecommunications Law requires³ that spectrum fees are set to ensure the efficient use of spectrum taking account of international best practice.

ictQATAR considers that efficient spectrum use will be promoted if fees are:

- Related to the amount of spectrum assigned where this amount is defined by bandwidth, area covered and duration of assignment. The exception would be where individual frequency license holders share frequencies from a common pool, in which case fees should be set as a flat rate (e.g. aircraft, ship or amateur station licenses);
- Set at a level that reflects the opportunity cost of spectrum access denied to others; and
- Set so that at a minimum and in aggregate, they equal or exceed the costs of license administration and spectrum management.

² i.e. the size of the geographic area over which access to the licensed spectrum is denied to other users

³ Article 4 (3) of the Telecommunications Law and Article 24 (4) of the Telecommunications By-Law.

Best practice involves setting fees on a transparent, objective and fair basis that is simple for licensees to understand and cost effective for all parties to administer⁴. Consistent with these principles, the Telecommunications Law requires ictQATAR to “establish a fair, objective and transparent licensing regime”⁵.

1.4.2 Proposed approach

For licenses that authorise use of pooled or shared spectrum in internationally allocated bands, such as those associated with aircraft, ships or amateur use, flat fees unrelated to the amount of spectrum used are considered appropriate. These are simple to apply and efficient. Hence aircraft, ship and amateur licenses will continue to be subject to station based fees as under the current fee regime, though revision of the level of some of these fees is proposed. A similar approach is proposed for individually licensed frequencies in frequency bands above 40 GHz. Receive only equipment or systems operating under a class license in the new licensing regime will not be subject to fees.

For all other radio spectrum users a fee structure that promotes efficient spectrum use should relate the fee paid to the amount of spectrum assigned. It is proposed that such fees should be set according to the following general formula:

$$\text{Fee} = \text{BV} \times \text{FBF} \times \text{CF} \times \text{TF} \times \text{OCF} \times \text{BW}$$

Where:

BV = Base value per MHz, to be set at a value that recovers ictQATAR’s total spectrum management costs when the formula is applied to all licensed services that are subject to a bandwidth based fee.

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

CF = Coverage Factor, which reflects the extent of the territory of Qatar over which access to the licensed spectrum is denied to other users (sometimes referred to as the area “sterilised”) by the licensed service

TF = Time factor which is set to a fraction of a year that the frequencies are assigned. In most cases the value will be 1, but there will be some cases of temporary licenses where the value could depend on the number of months of use.

OCF = Opportunity cost factor. The OCF is 1 in uncongested bands (i.e. where demand for spectrum is not expected to exceed the available supply). In congested bands the OCF is more than 1 and is determined by the estimated opportunity cost of spectrum.

BW = Licensed Bandwidth in MHz

This formula is intended to apply to all Radio Spectrum Licenses where the license includes a specific frequency assignment⁶, including fixed links (point to point and point to multipoint),

⁴ Such a requirement reflects broad international practice and is explicitly referred to, for example, in Article 12 of the EU Authorisation Directive. See also “Essentials of Modern Spectrum Management”, Cave, Doyle and Webb, Cambridge University Press, 2007

⁵ Article 2(8) of the Telecommunications Law

⁶ Other than assignments above 40 GHz as discussed in section 2.4

fixed satellite earth stations, private mobile radio (PMR), cellular systems, broadcasting, telemetry systems, aeronautical ground stations, maritime coastal stations, radars and beacons. The formula will also be used to calculate fees for individual licenses granted for operation in ISM bands⁷, but with a reduced frequency band factor (FBF) value of 1 to reflect the non-protected nature of these bands and the consequently lower spectrum management costs incurred.

A number of similar formulae are used in other countries, both in the Gulf region and elsewhere. The proposed formula has the advantage that it provides appropriate incentives for efficient spectrum use without being unduly complex or requiring information that ictQATAR does not already collect. The specific parameter values relating to different services are addressed in later sections of this document.

A key consideration that affects the fee level is whether the frequencies assigned are in a band that is congested. For bands that are not congested we propose to set fees that are sufficient to recover ictQATAR's costs of spectrum management. For bands that are congested, we propose to set fees at a market value based on benchmarking.

Question C1.	Do you consider that the proposed formula for setting Radio Spectrum License Fees is appropriate? If not, please explain your reasoning and propose an alternative approach.
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Further details of the proposed methodology for setting annual spectrum fees and the proposed fee levels are presented in the remaining sections of this document.

⁷ For clarification on which ISM band systems will be subject to individual licensing please refer to the Radio Spectrum Licensing framework, available at www.ictqatar.qa/en/documents/document/guidebook-radio-spectrum-licensing-framework

2 Flat rate annual Radio Spectrum License Fees

Where Radio Spectrum Licenses provide access to a common pool of frequencies rather than to individually assigned frequencies, a flat rate annual fee (i.e. independent of bandwidth) is proposed. This approach is appropriate for aircraft, ships and amateur licenses. A similar approach is also proposed for individually licensed frequencies in frequency bands above 40 GHz where the probability of interference is very low. The proposed fee levels for each of these license categories are presented in the following sections. Note that all licenses that have a term of at least one year will be subject to a minimum annual fee of **QAR500** per license and temporary licenses will be subject to a minimum fee of **QAR250**.

2.1 Aircraft and Ship Station Licenses

Ships and aircraft generally have access to a large pool of shared frequencies for both communication and navigation purposes but use only a limited subset of this pool at any given time. It is therefore not appropriate to charge fees for such stations on a bandwidth basis, but rather to apply a flat rate fee that reflects the administrative costs involved in issuing the license and recovers some of the spectrum management costs associated with the aeronautical and maritime bands.

For ships and aircraft, administrative costs are substantially independent of the type of vessel or craft involved, however the spectrum management costs are likely to be dependent on the type and number of radio systems installed. For example, larger ships entering international waters are required under SOLAS rules to carry specific radio systems for communication and navigation and this entails a need on the part of the regulator to ensure the frequencies used by these systems are free from interference. Smaller inshore vessels typically have more limited radiocommunications facilities. Similarly, large commercial aircraft are equipped with multiple radar and communication systems operating in a range of frequency bands, such as radio altimeters and weather radars, whereas smaller aircraft are typically limited to basic voice communication systems. There is therefore a valid case for differentiating between large commercial craft and smaller private craft in both the aeronautical and maritime sectors.

2.1.1 Proposed fees for aircraft station licenses

The most common international approach to differentiating between smaller and larger aircraft for fee setting purposes (used, for example in Jordan, Oman and the UK) is to base the annual fee on the take-off weight of the aircraft. A break point of 14,000 kg is used to differentiate between larger and smaller aircraft in these countries. It is proposed that this same breakpoint will apply in Qatar and that fees will be as follows:

- **Take-off weight up to 14,000 kg: QAR 500**
- **Take-off weight above 14,000 kg: QAR 2,000**

2.1.2 Proposed fees for ship station licenses

A similar approach is proposed for ship station licenses, with a higher fee applying to large seagoing vessels and a smaller fee for smaller inshore vessels. As the current fee for **small**

ships (up to 300 gross tonnes) is comparable to the level applied in other countries, we propose to retain this at the current level of **QAR 500**.

For **larger ships** (300 gross tonnes and above), where a fee is currently applied per installed equipment, a single fixed fee of **QAR 2,000** is proposed, (i.e. irrespective of the quantity of equipment installed) which reflects practice elsewhere, including the Gulf region, and will reduce the level of administrative complexity.

2.2 Amateur Licenses

QATAR currently charges amateur license holders an annual fee of **QAR 500** per call sign and we do not propose to change this.

Practice varies internationally with regard to the issuing of additional call signs, e.g. for use in contests, or where “vanity” call signs are requested. For example, the US does not charge a fee for additional call signs unless a specific vanity sign is requested, in which case a once-off fee of USD14.20 (QAR 52) applies, whereas Canada applies a once-off fee of CAD 60 (QAR 219) for each additional call sign. New Zealand allows amateurs to have a primary and secondary call sign for no extra charge, whilst Ofcom in the UK will issue temporary additional call signs free of charge but only for use in connection with specific pre-ordained contest events. A similar situation exists in Australia.

Having reviewed the international situation and bearing in mind the limited demand for amateur licenses in Qatar compared to more populous countries, it is proposed that in future the license will provide a primary and secondary call sign at no extra cost, but that any additional call signs or assignment of specific “vanity” call signs should be chargeable on a once-off basis. It is proposed that the annual fee for such additional call signs should be set at **QAR100**, which is comparable to levels set elsewhere.

A fee of **QAR 500** per annum is also proposed for users of CB radio.

2.3 Fees for test and development licenses

Test and development applications support research into radiocommunications technologies or the maintenance and repair of radiocommunications equipment. These activities are carried out under laboratory conditions and thus they are not associated with the operational use of radiocommunications equipment. It is proposed that a flat rate fee of **QAR500** per annum shall be charged for each test and development site.

For the avoidance of any doubt:

1. Users with more than one test and development site will require one test and development license per site.
2. Should it be necessary to use test and development radios under operational conditions, then an application for the appropriate type of Radio Spectrum License shall be made.

2.4 Fees for individually licensed equipment operating at frequencies above 40 GHz

It is proposed that equipment operating on individually licensed frequencies in frequency bands above 40 GHz will be subject to a flat rate annual fee of **QAR 500**. This fee reflects the relative abundance of spectrum and low probability of interference in these bands compared to other individually licensed frequency bands.

3 Fees for individual assignments in frequency bands below 40 GHz

3.1 Introduction

In Section 1 a formula for setting fees was proposed, namely:

$$\text{Fee} = \text{BV} \times \text{FBF} \times \text{CF} \times \text{TF} \times \text{OCF} \times \text{BW}$$

Where:

BV = Base value per MHz, to be set at a value that recovers ictQATAR's total spectrum management costs when the formula is applied to all licensed services that are subject to a bandwidth based fee.

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

CF = Coverage Factor, which reflects the extent of the territory of Qatar over which access to the licensed spectrum is denied to other users (sometimes referred to as the area "sterilised") by the licensed service

TF = Time factor which is set to a fraction of a year that the frequencies are assigned. In most cases the value will be 1, but there will be some cases of temporary licenses where the value could depend on the number of months of use.

OCF = Opportunity cost factor. The OCF is 1 in uncongested bands (i.e. where demand for spectrum is not expected to exceed the available supply). In congested bands the OCF is more than 1 and is determined by the estimated opportunity cost of spectrum.

BW = Licensed Bandwidth in MHz

This section proposes values for the BV, FBF, CF and TF formula parameters. In bands below 40 GHz that are classed as uncongested, i.e. where demand for spectrum is not expected to exceed the available supply, the OCF is set equal to one. The BV is set so that fees in uncongested bands recover in aggregate ictQATAR's license administration and spectrum management costs. In bands that are classed as congested, a higher OCF value is applied. The derivation of the OCF value for congested bands is addressed in section 4.

3.2 Setting the Frequency Band Factor (FBF)

The frequency band factor (FBF) should reflect the characteristics of different frequency ranges in terms of the total available bandwidth, typical channel widths, coverage or path length that can be achieved 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 general, higher frequencies in the microwave range tend to provide less coverage and less versatility as they become increasingly limited to line of sight transmission and are subject to increasing attenuation with frequency. Applying a lower frequency band factor to higher frequency fixed link bands also encourages the use of these bands for shorter links and generally encourages the use of higher frequency, less congested, bands where possible, reducing the likelihood of congestion arising in lower frequency bands.

Four objectives have guided the setting of the FBF values for specific frequency bands, namely:

- i) Providing an incentive to use the highest frequency band that is suitable and available;
- ii) Reflecting the physical characteristics of different frequency bands, in particular the relative transmission range that can be achieved;
- iii) Equitable apportionment of cost recovery across licensees, noting that transmissions in lower frequency bands tend to travel further and that interference is therefore more likely to result in lower frequency bands, incurring higher spectrum management and enforcement costs; and
- iv) Avoiding undue complexity in the application of the fee formula.

A balance between these four objectives can be achieved by defining a limited number of broad frequency ranges, corresponding to the main frequency bands currently in use in Qatar, and applying an FBF value that reflects the approximate relative free space transmission range achievable in each frequency range. A total of seven frequency ranges have been defined, extending from below 470 MHz to above 19.7 GHz. Each range covers approximately one octave in frequency terms and since the free space transmission range is inversely proportional to frequency it is appropriate to apply a ratio of 2 to the FBF values in adjacent frequency ranges.

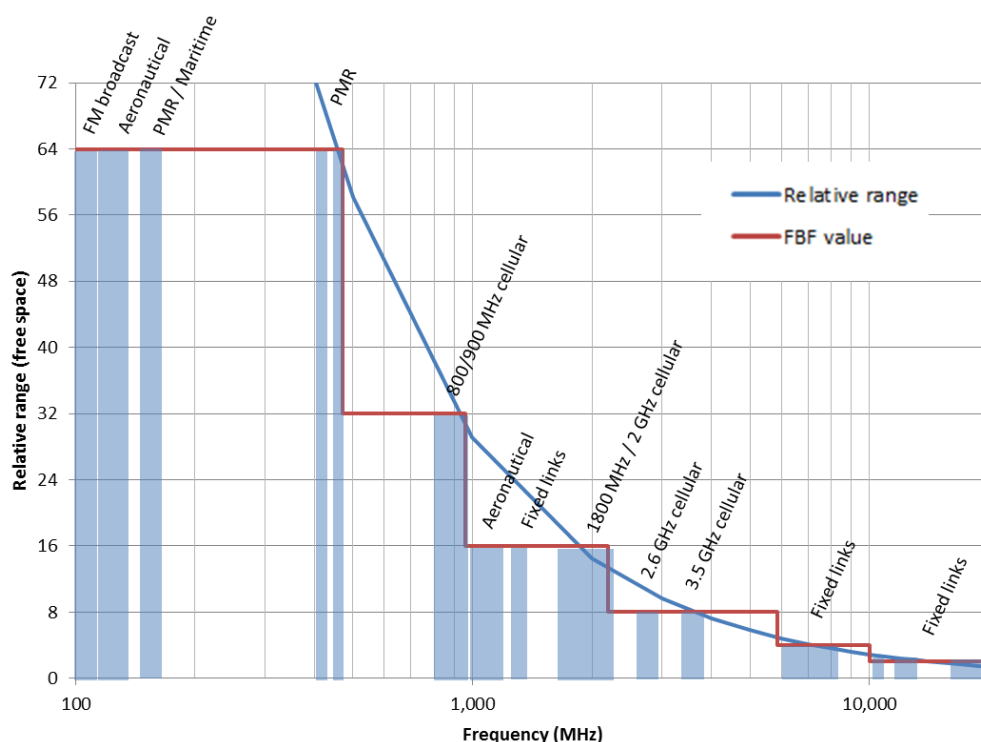
The seven proposed frequency ranges are shown in Table 1 below:

Table 1. Proposed Frequency Band Factor values for spectrum fee formula

Frequency	FBF	Principal frequency bands for licensed services
Up to 470 MHz	64	VHF broadcasting, aeronautical, maritime and PMR; UHF PMR
470-960 MHz	32	UHF broadcasting, 800 / 900 MHz cellular
960-2200 MHz	16	UHF / L-band aeronautical, 1.4 GHz fixed links, 1800 MHz / 2 GHz cellular
2200-5875 MHz	8	2.6 GHz cellular and 3.5 GHz BWA, S-band aeronautical and maritime, 5 GHz and 5.8 GHz ISM bands
5785-10000 MHz	4	6, 7 and 8 GHz fixed links (long range), C-band satellite uplinks
10.00 - 19.7 GHz	2	10 GHz, 13 GHz, 15 GHz and 18 GHz fixed links (medium range), Ku-band satellite uplinks
>19.7 GHz	1	Short range fixed links, Ka-band satellite uplinks

The relationship between the FBF values and the relative transmission range in each frequency range is illustrated in Figure 1 below:

Figure 1 Derivation of FBF values based on relative free space transmission range vs frequency



It is proposed that individually licensed systems operating in the non-protected ISM bands 2400-2483.5 MHz, 5150-5350 MHz, 5470-5725 MHz and 5725-5875 MHz will be subject to a frequency band factor of 1.

Question C2. Do you think that the proposed Frequency Band Factor (FBF) values are appropriate for use in the formula for setting Radio Spectrum License Fees? If not, please explain your reasons and propose an alternative approach.

3.3 Setting the Coverage Factor (CF)

3.3.1 Introduction

The coverage factor is included in the formula to ensure that the fee charged reflects the size of the geographic area over which access to the licensed spectrum is denied to other users (sometimes referred to as the “sterilised area”). Typically, the size of the sterilised area is considerably larger than the licensee’s required coverage area, in order to avoid interference arising between neighbouring licensees using the same frequency.

The required coverage area for a private mobile radio (PMR) or telemetry system can range from a single building or industrial site to a sizeable geographic area covering most or all of Qatar. Where highly localised or on-site systems are deployed, frequencies can be re-used several times at different locations in Qatar and a lower fee is therefore justified. Conversely, systems operating over larger geographic areas are more likely to generate or to suffer from interference, incurring higher spectrum management costs and therefore justifying a higher fee.

In a small country like Qatar with relatively flat terrain the opportunity to reuse frequencies is limited, but for low power systems with a service coverage range of 1 km or less we consider it likely that at least 6 geographically separate users could be accommodated on the same frequency, i.e. a re-use factor of 6 can be assumed. A coverage factor value of 1 for such low power, small area deployments is proposed.

As coverage increases the re-use capability will decrease, to the extent that a system with a coverage radius in excess of 25 km is likely to make it difficult to re-use that frequency anywhere else in Qatar. We therefore propose that such systems be treated as national for fee calculation purposes and a coverage factor of 6 is proposed, on the basis that 6 or more small area systems could otherwise be accommodated. In between these extremes we propose two further coverage factor values, corresponding to local area and wide area systems with coverage radii in the range 1 – 12.5 km and 12.5 – 25 km respectively. Four coverage categories are therefore proposed, namely small area, local area, wide area and national.

For most types of license, the coverage category is defined either by the coverage area in km², the maximum coverage radius in km or the transmitter effective radiated power (ERP) in watts. The choice of coverage criterion will depend on the type of license and the information that is available. Area based licenses that may comprise multiple transmitting stations will generally have a defined coverage area specified as a contour beyond which a certain field strength should not be exceeded. In such cases the fee will be determined according to the actual coverage area within the contour. If it is not practical to define the actual coverage area, a coverage radius will be defined from a central point corresponding to the maximum extent of network coverage, or in the case of point to multipoint or mesh based networks the most remote transmitting station in the network.

Transmitter ERP will be used for frequency based private mobile radio (PMR) licenses comprising individual base stations. Fees for individual point to point fixed links and radiodetermination systems (radars, beacons and navigation equipment) will be set at a rate

equivalent to small area coverage licenses. Fees for point to point link block allocations and satellite earth stations (including VSATs and satellite news gathering) will be set at the national coverage level.

3.3.2 Setting the Coverage Factor for specific services

3.3.2.1 Private Mobile Radio and Trunked Mobile Radio (PMR and TMR)

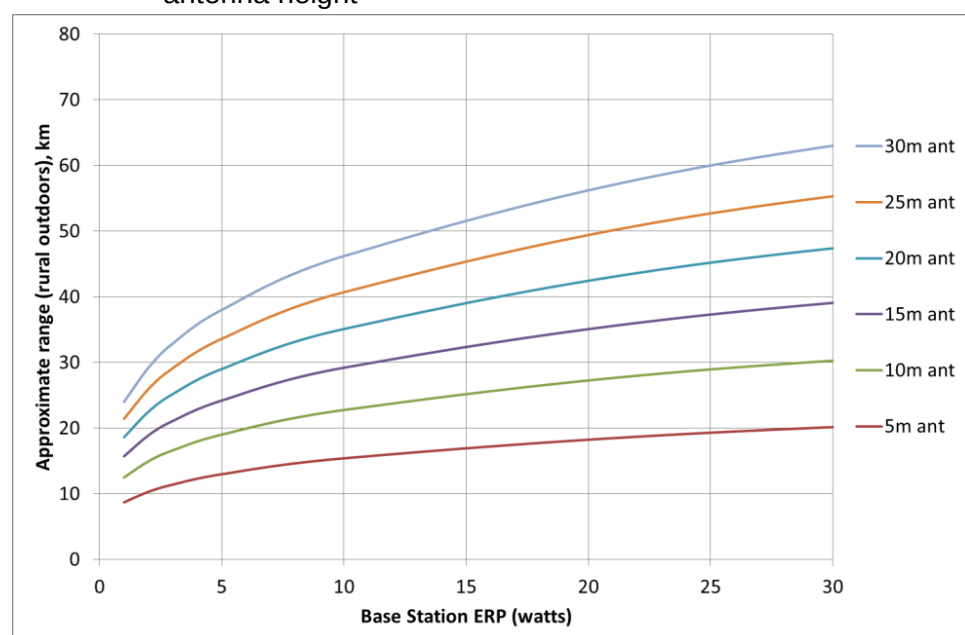
The new licensing regime that has recently undergone consultation proposes three types of PMR license, namely Area Based, Band Based and Frequency Based. Area and Band Based licenses assign frequencies for use within a specified geographic area, whereas Frequency Based licenses relate to specific base stations at specific geographic locations. For Area and Band Based licenses, the coverage factor should reflect the actual geographic area of the license, in accordance with Table 2. Note that any network with a coverage area in excess of 2,000 sq km will be treated as a national network and assigned a coverage factor of 6, since it is unlikely that the licensed frequency could be re-used elsewhere in Qatar.

Table 2: Coverage factor for PMR and TMR services (band and area based licenses)

Total geographic coverage area, A (sq km) and approximate equivalent radius, R (km)		Coverage Factor (CF)
$A \leq 5$	$R \leq 1$	1
$5 < A \leq 500$	$1 < R \leq 12.5$	2
$500 < A \leq 2,000$	$12.5 < R \leq 25$	3
$A > 2,000$	$R > 25$	6

For Frequency Based licenses, the coverage factor should ideally reflect the coverage of the individual base station licensed. In practice this can be estimated from the effective radiated power (ERP) of the base station transmitter, although the antenna height can also have a significant impact on the range. Figure 2 below shows the typical range of a PMR base station transmitter in a rural area as a function of ERP and transmitter height.

Figure 2: Approximate PMR base station range as a function of ERP and antenna height



In practice, the actual range may be up to 50% lower due to terrain or other obstructions, depending on the actual location of the base station and its users. Taking this into account and assuming a typical base station antenna height in the range 10 - 20 metres for local area coverage and 20-30 metres for wide area coverage, we propose to set the coverage factor for frequency based PMR licenses on the basis of base station ERP, in accordance with Table 3:

Table 3: Coverage Factor for Frequency Based PMR licenses

Base Station ERP (Watts)	Coverage Factor (CF)
Less than or equal to 1	1
Greater than 1 but less than or equal to 5	2
Greater than 5 but less than or equal to 25	3
Greater than 25	6

Question C3. Do you think that the proposed Coverage Factor (CF) values shown in Tables 2 and 3 are appropriate for setting Radio Spectrum License Fees for PMR/TMR systems? If not, please explain your reasons and propose an alternative approach.

3.3.2.2 Scanning Telemetry and SCADA systems

For scanning telemetry and supervisory, control and data acquisition (SCADA) systems operating in the UHF bands, the coverage factor will depend on the license category, as defined under the new licensing regime and in accordance with Table 4.

Table 4: Coverage Factor for Scanning Telemetry and SCADA systems

License Category	Coverage Factor (CF)
Small area networks	1
Local area networks	2
Wide area networks	3
National Networks	6

Question C4. Do you think that the proposed Coverage Factor (CF) values are appropriate for setting Radio Spectrum License Fees for Scanning Telemetry and SCADA systems? If not, please explain your reasons and propose an alternative approach.

3.3.2.3 Satellite Earth Stations

Assignments in bands shared on a co-primary basis with terrestrial fixed services:

For fixed satellite earth stations, given the relatively small geographic area of Qatar and the relatively large interference co-ordination distances required, the coverage area is assumed to be national, i.e. a coverage factor of 6 will apply when setting satellite fees. Coverage in this context refers not to the actual usable coverage area but to the area in which use by another user or service is denied.

In the case of Very Small Aperture Terminals (VSATs), it is proposed that VSAT systems be treated as a single fixed satellite earth station for fee setting purposes, regardless of the number of terminals, i.e. a coverage factor of 6 should apply.

Assignments in bands allocated to satellite services on an exclusive primary basis:

Given the level of orbital discrimination possible with satellite earth stations, a re-use factor of 6 is should be achievable despite the small geographic area of Qatar. It is therefore

proposed that a coverage factor of 1 (i.e. equivalent to one sixth of national coverage) should apply to satellite earth station assignments in bands allocated on an exclusive basis to satellite services.

Mobile satellite services that operate in frequency bands that are exclusive to satellite services (i.e. that are not shared with terrestrial radio links) will be covered by a class license under the new licensing regime and will not therefore be subject to Radio Spectrum License fees.

Question C5. Do you think that the proposed Coverage Factor (CF) values are appropriate for setting Radio Spectrum License Fees for Satellite Earth Stations? If not, please explain your reasons and propose an alternative approach.

3.3.2.4 Point to Point Fixed Links

Unlike mobile services, point to point fixed links do not serve a geographic area but connect two specific geographic locations. Although the effective radiated powers deployed are much higher than mobile base stations, implying much larger separation distances, highly directional antennas are deployed enabling frequencies to be re-used geographically so long as co-frequency stations are not directionally aligned with one another. In practice, the typical levels of re-use achieved in shared fixed link bands in Qatar currently are comparable to those in PMR bands, i.e. a re-use factor of at least 6 is typically achievable. It is therefore proposed that a coverage factor of 1 (i.e. equivalent to one sixth of national coverage) should apply to individually licensed fixed links.

For fixed links that operate over the same path and on the same frequency but use orthogonal polarisation, it is proposed that the second link be subject to a 50% discount to reflect the greater spectrum efficiency which results, i.e. for the second link the coverage factor should be set to 0.5.

Where fixed link spectrum is assigned nationally on an exclusive basis to a single licensee (sometimes referred to as a block allocation), the national coverage factor (6) will apply.

Question C6. Do you agree with the proposed Coverage Factor (CF) value of 1 for individually licensed fixed links? If not, please explain your reasons and propose an alternative approach.

3.3.2.5 Point to Multipoint Fixed Links

Individually licensed point to multipoint (PMP) fixed links are similar to PMR systems in that they comprise a base or hub station that connects to a number of remote terminal stations. The coverage area is effectively defined by the distance of the furthest terminal from the hub station. It is proposed that the coverage factor for PMP systems will be based on similar coverage radii to those proposed for PMR systems, as indicated in Table 5.

Table 5: Coverage Factor for point to multipoint fixed links

Distance from hub to most distant terminal station (R, km)	Coverage Factor (CF)
$R \leq 1$	1
$1 < R \leq 12.5$	2
$12.5 < R \leq 25$	3
$R > 25$	6

Question C7. Do you think that the proposed Coverage Factor (CF) values are appropriate for setting Radio Spectrum License Fees for point to multipoint fixed links? If not, please explain your reasons and propose an alternative approach.

3.3.2.6 Radio and TV broadcasting

For analogue and digital radio and TV transmitters we propose that the coverage factor is based on the actual estimated size of each transmitter's service coverage area, using the same criteria as for Area and Band based PMR licenses. This is shown in Table 6.

Table 6: Coverage Factor for broadcast networks

Total geographic coverage area, A (sq km) and approximate equivalent radius, R (km)		Coverage Factor (CF)
$A \leq 5$	$R \leq 1$	1
$5 < A \leq 500$	$1 < R \leq 12.5$	2
$500 < A \leq 2,000$	$12.5 < R \leq 25$	3
$A > 2,000$	$R > 25$	6

For satellite broadcasting, in line with international practice license fees will not be applied to downlink (space to earth) transmissions. Uplink (earth to space) transmissions will be subject to the same fees as other fixed satellite earth stations.

Question C8. Do you think that the proposed Coverage Factor (CF) values are appropriate for setting Radio Spectrum License Fees for broadcasting transmitters? If not, please explain your reasons and propose an alternative approach.

3.3.2.7 Radio Determination Systems

Radio determination systems include radars, beacons and other radio navigation services. In general these tend to operate in dedicated bands and deploy directional aerials and/or discontinuous transmission which effectively reduces their impact on other spectrum users. It is proposed that normally a coverage factor of 1 should apply to such systems, however, ictQATAR reserves the right to apply a higher value in some circumstances, e.g. where very high powers are deployed, non-standard frequency bands used or equipment does not comply with current international standards.

Question C9. Do you think that the proposed Coverage Factor (CF) values are appropriate for setting Radio Spectrum License Fees for radio determination stations? If not, please explain your reasons and propose an alternative approach.

3.4 The time factor (TF)

Spectrum fees will be defined as the fee for the period 1st January to 31st December each year. The time factor value in the fee formula will be 1 for this period. Where licenses are issued part way through a year or on a temporary basis (i.e. for a period of time less than the full year) or a license is surrendered part way through the year, the time factor will be equal to the license duration in months (rounded up to the nearest month) divided by 12. For example:

1. If a license is issued on 10th August on a non-temporary basis, then the fee payable for the first year of the license will be calculated as follows:

- i. Period of license during the first year = August to December inclusive = 5 months
- ii. The fee for the first year = (annual fee) x (5 ÷ 12)

Note: The fee for subsequent years will be the full annual fee.

2. If a temporary license is issued for the period 5 April to 31st May, the fee payable will be calculated as follows:

- i. Period of license = April and May = 2 months
- ii. The fee for the 2 months period = (annual fee) x (2 ÷ 12)

Where a license is surrendered part way through the year and the full annual license fee has already been paid, a refund will be issued corresponding to the number of months remaining to the year end divided by 12.

Temporary Frequency Licenses have a maximum term of 3 months and will be subject to a minimum fee of **QAR250**, in all other cases a minimum fee of QAR 500 will apply.

Question C10. Do you have any views on the proposed approach to setting the Time Factor (TF) values to be used in the formula for setting frequency and spectrum license fees? Please explain your reasoning.

3.5 Determining the base value per MHz (BV)

We propose to set the base value for Radio Spectrum License Fees at a level which achieves full recovery of ictQATAR's estimated total spectrum management costs when apportioned across all holders of Radio Spectrum Licenses, in accordance with the fee formula defined above. These costs in 2012 amounted to approximately QAR 13 million. To determine the appropriate base value, the following formula was applied to each current frequency assignment applying FBF, CF and TF values as defined above and the bandwidth (BW) of the assignment:

$$\mathbf{SU = BW \text{ (MHz)} \times FBF \times CF \times TF}$$

where **SU** is the effective spectrum utilisation (SU) for each assignment, in terms of licensed bandwidth, frequency band and coverage factor.

The base value was then determined by dividing ictQATAR's current estimated total costs of spectrum management (QAR13 million), less the amount recovered from station licenses subject to flat rate fees, by the sum of the SU values for all current frequency licenses, i.e. using the following formula:

$$BV = \frac{\text{Total spectrum management costs} - \text{revenue raised from station fees}}{\sum (BW \times FBF \times CF \times TF)}$$

This yields a base value of **QAR 130 per MHz**.

Question C11. Do you have any views on the proposed base value (BV) value to be used in the formula for setting frequency and spectrum license fees, or on the approach adopted in setting this base value? Please explain the reasoning behind any comments that make.

4 The level of fees in congested bands

4.1 Identification of congested bands

Bands are defined as congested if, at current fee levels, demand exceeds supply now or is likely to in the medium term i.e. over the next 5-10 years⁸. The Qatar Spectrum Policy Review found demand (at current fee levels) for spectrum in most of the bands harmonized for public mobile services (e.g. 800 MHz, 900 MHz, 1800 MHz, 2.1 GHz and 2.6 GHz) exceeds the available supply now or this is likely to continue to be the case over the next 5 - 10 years. In addition excess demand for licenses in the FM radio band was reported in the Spectrum Policy Review.

More recent analysis of market information and ictQATAR licensing data indicates that the following bands are congested and so warrant fees set based on opportunity cost:

- **The FM broadcast band: 88-108 MHz:** All 14 high power FM radio frequencies allocated to Qatar under GE84 have now been assigned and, given the small size of Qatar and the proximity of neighbouring countries, there are no opportunities to reuse these frequencies as to do so would cause cross border interference. There is demand for additional high power frequencies but additional broadcasters can only be accommodated on low power assignments and even here there appears to be excess demand; a further 6 low power assignments for Doha are planned (< 1 kW), but demand exists for up to 25 additional assignments.
- **Bands used for public mobile services below 3 GHz in the following frequency ranges: 694-862 MHz, 880-960 MHz, 1710-2200 MHz and 2500-2690 MHz.** There is demand for spectrum in these bands from public mobile operators and government

⁸ A five to ten year time frame is taken because fees will only be fundamentally reviewed every 5-10 years.

users. The way in which spectrum is reserved for particular operators complicates the assessment of congestion. For example, if all of the spectrum in the public mobile/BWA bands was offered, at current fee levels, to any potential user (public mobile operator, government user or others) then ictQATAR believes it would be taken up. The system of reservations for particular users and a staged release approach means that demand is often suppressed. Furthermore, decisions about licensing a third operator have not yet been made and so the associated spectrum reservations must be assumed to continue. Rapid increases in traffic growth on mobile networks are expected at a global level⁹ and it can be expected this will also be the case in Qatar given high income levels and continuing population growth (albeit at levels lower than those experienced historically). It is therefore anticipated that public mobile bands below 3GHz will be congested in the main urban areas in Qatar¹⁰.

- **VHF and UHF bands for PMR in the following frequency ranges: 146-174 MHz, 410-430 MHz and 450-470 MHz.** Demand for PMR spectrum in Qatar currently varies by frequency band, However bearing in mind the growing importance of sub-1 GHz radio spectrum internationally to meet growing demands for mobile data services, it is proposed that all of the following bands be treated as congested for fee setting purposes.
 - 145-156 MHz
 - 165 – 174 MHz
 - 410 – 430 MHz
 - 450 – 470 MHz
- **VHF Aeronautical and Maritime Mobile Bands in the frequency ranges 118-137 MHz and 156-165 MHz.** The Gulf region is a major international hub for both aviation and shipping as well as being a major producer of offshore oil and gas. This places a particular heavy demand on the internationally coordinated VHF frequency bands used to provide essential communications to aircraft, ships and offshore platforms. It is therefore proposed that the following frequency bands will be treated as congested for fee setting purposes:
 - 118 – 137 MHz (aeronautical mobile)
 - 156 – 165 MHz (maritime mobile)

Question C12. Do you have any comments on ictQATAR's conclusions regarding the bands that are identified as being congested in Qatar? Please explain your reasoning.

⁹ ITU-R M.2243 Assessment of the global mobile broadband deployments and forecasts for International Mobile Telecommunications; *Cisco Visual Networking Index – Global Mobile Data Traffic Forecast Update, 2011-2016*, Cisco, February 2012

¹⁰ Spectrum demand is driven largely by requirements in high use, high density areas, such as major cities. The urban areas of Qatar are as densely populated as other large cities in affluent countries and so demand for spectrum in Doha can be expected to be comparable to that in other large developed cities.

4.2 Basis for opportunity cost fees

Efficient spectrum use will be promoted when spectrum fees are set to reflect the opportunity cost of spectrum access. The opportunity cost is the value of the opportunity forgone by current spectrum use, i.e. the value of the spectrum to the next best alternative use or user of the spectrum. If spectrum is auctioned then the auction price would equal the opportunity cost of spectrum. It is for this reason that some regulators¹¹ have used international benchmarks from spectrum auctions to set opportunity cost based fees for congested spectrum that is not auctioned, particularly in the case of bands used for cellular mobile services. International benchmarks have been used to inform our view of fee levels for congested bands.

The values derived are expressed as Qatari Riyals per MHz. In terms of the general formula derived above in Section 1.4.2:

$$\text{Value/MHz} = \text{BV} \times \text{FBF} \times \text{CF} \times \text{TF} \times \text{OCF}$$

the OCF value can be derived once we have estimated the opportunity cost as a value per MHz.

4.2.1 Fees in congested bands harmonised for public mobile/BWA services

To derive indicators of the opportunity cost of spectrum used by cellular and BWA services in Qatar the following evidence for the 800MHz, 900MHz, 1800MHz, 2100MHz and 2600MHz bands was reviewed:

- Recent auction results for affluent countries with relatively small populations: Denmark, Norway, Sweden, Switzerland and Singapore.
- Fees paid in several Middle East countries: Bahrain, Jordan and the UAE.

Lump sum values were converted to annual payments and adjusted for differences in population so as to put them on a comparable basis. Table 7 shows the average values for the benchmarks and the current fees in Qatar.

Table 7: Average fees in benchmark countries and values in Qatar

Frequency Range	Value/MHz: Auction benchmarks (QAR)	Value/MHz: Middle East benchmarks (QAR)	Fee/MHz: Qatar current spectrum fee schedule (QAR)
Under 1 GHz	230,000	202,000	23,660 (<800 MHz) 18,200 (800MHz-1GHz)
1 – 2.2 GHz	198,000	152,000	18,200 (1-1.9GHz) 14,560 (1.9-2.1 GHz)
Above 2.2 GHz	81,000	134,000	14,560

¹¹ Examples include Ofcom in the UK and DBCDE in Australia, both of whom use international market benchmarks to set license renewal fees. Other regulators have used international auction results to inform the level of reserve prices in auctions (e.g. Comreg in Ireland).

Taking account of these benchmarks the fees per MHz shown in Table 8 are proposed for congested bands used by cellular mobile services. It is proposed that the congested band fees apply to all frequency ranges that are assigned for the provision of cellular mobile services between 694MHz and 2.7 GHz. This frequency range includes the frequencies in the 700MHz range that are used and/or are proposed for use in many countries in North America and Asia, and probably also for much of the Middle East and Africa. While in time the 3.4-3.6 GHz band may be used for mobile services this band is not included as it is unlikely to be congested in Qatar on a five year view.

Table 8: Proposed Fees for congested bands

Frequency Range (MHz)	Fee QAR/MHz – Benchmarked value for bands that are designated as congested in the frequency range
0-960	200,000
960-2200	150,000
2200 - 2700	80,000

It is standard international practice not to charge opportunity cost based fees for licenses where an auction fee was paid – this would be charging twice for the spectrum. In Qatar, Vodafone has already paid QAR7.7bn for its operator license with associated spectrum at 900MHz, 1800MHz and 2.1 GHz. Therefore, it is proposed that Vodafone shall pay annual spectrum fees for the frequency bands it was assigned (i.e. at 900MHz, 1800MHz and 2100 MHz) at the auction with the OCF set to 1, (i.e. pay the element of the fee associated with recovery of the spectrum management costs only), as if these bands were not congested. but that it pays the full fees for additional spectrum in these or other frequency ranges that it may be assigned other than by auction.

Question C13. Do you have any comments on ictQATAR's proposals for fees in congested bands used by public mobile services? Please provide evidence to support your views.

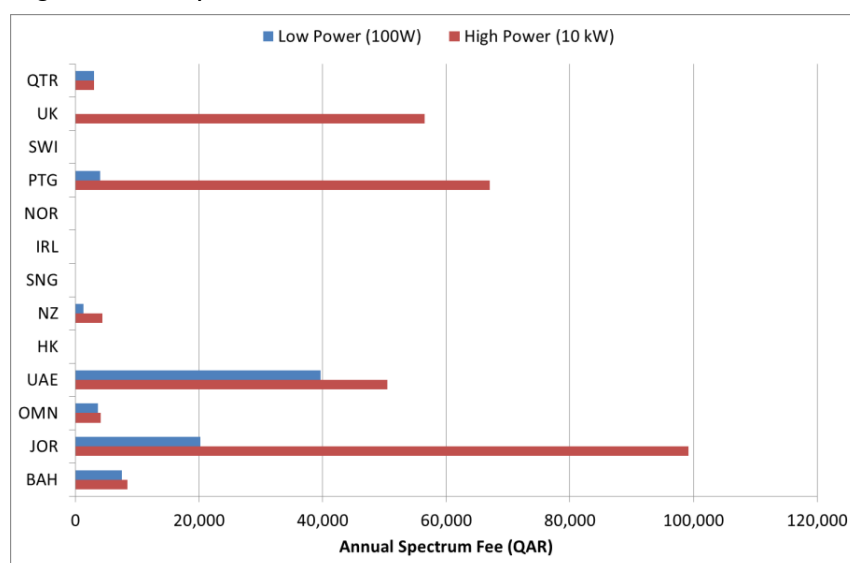
4.3 Fees in other congested bands

It is proposed that fees in congested PMR bands (at VHF and UHF) and the congested FM radio band are set using the same values/MHz as for the public mobile bands below 1 GHz shown in Table 8 above. The reasons for setting fees at these levels for congested PMR and FM radio bands are given in the sub-sections below.

4.3.1 FM radio

The current frequency fee for a high power FM broadcasting station in Qatar is QAR3,000. As can be seen in Figure 3 below the current fee for FM radio in Qatar is very low compared with international benchmarks. Furthermore international auction benchmarks generally imply even higher values as can be seen in Table 9 below.

Figure 3: Comparison of fees for FM radio licenses



Source: Data collected from regulators.

Table 9: Value of FM radio licenses sold at auction

Country, date	Value and nature of licenses	Implied value in \$US per MHz per pop	Implied value of a station primarily serving Doha using 300kHz (QAR)
Australia, 2004	Sydney ¹² - AUD106m	50	54m
	Brisbane ¹³ - AUD80m	90	97m
Denmark, 2003	National license – assumes uses 2MHz – sold, operator withdrew and then resold to TV 2 for €3m	0.4	430,000
Netherlands, 2003	Whole 20 MHz band cleared and sold for €300m	1.3	1.4m
New Zealand, 2008	Wide range of values depending on population served ¹⁴	Range between 0.3 and 8	320,000 – 8.6m
UK 2006 ¹⁵	£1.8m/MHz for a national license	0.06	65,000

Source: Plum analysis of auction data

¹² http://www.acma.gov.au/WEB/STANDARD/pc=PC_91585

¹³ http://www.acma.gov.au/WEB/STANDARD/pc=PC_91592

¹⁴ <http://www.rsm.govt.nz/cms/policy-and-planning/current-projects/radiocommunications/rights-at-expiry/am-fm-renewal/data-on-offer-4-of-licences/data-on-offers-of-licences-vhf-fm/>

¹⁵ <http://stakeholders.ofcom.org.uk/binaries/consultations/futurepricing/annexes/aipstudy.pdf>

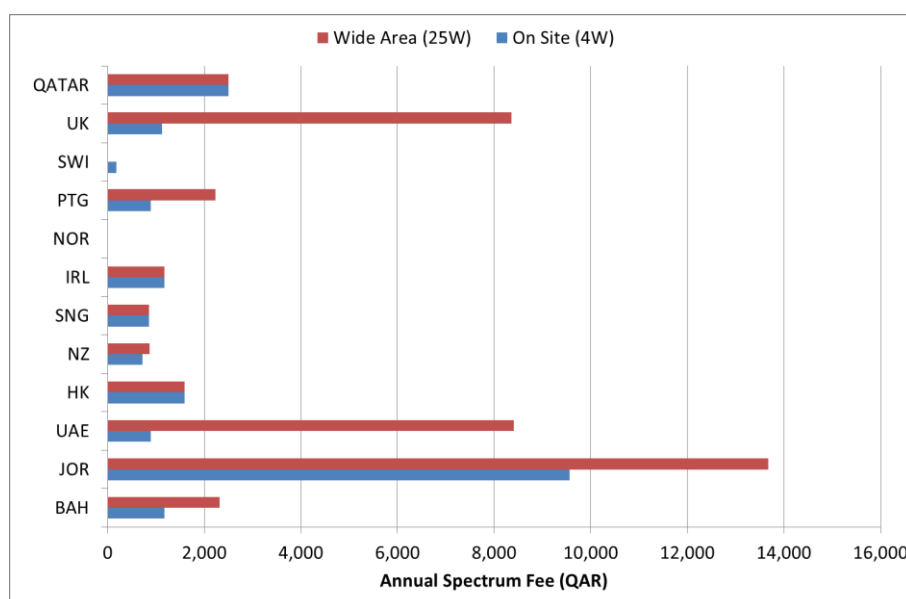
The proposal at the start of this section to set fees for FM radio at a rate of QAR200,000/MHz (as in Table 8 for frequencies under 960MHz) would mean the fees paid for a high power FM radio assignment with a bandwidth of 300kHz would amount to QAR60,000 assuming that a high power FM radio assignment is treated as a national assignment. This is clearly a substantial increase relative to the current fee level of QAR3,000 but would mean fees in Qatar would be comparable with fees in Portugal, the UK and the UAE but below those in Jordan and those achieved in a number of auctions of FM radio licenses.

4.3.2 Fees for PMR in the VHF and UHF bands

In Qatar fees for individual PMR licenses (base station + 10 mobiles) are around QAR2,500 and much higher fees are paid for trunked PMR network licenses. The fees for individual PMR licenses are in the mid-range of the countries surveyed (see Figure 4). The comparison with the fees in the UK is particularly relevant because the UHF band is classed as congested in certain areas of the UK, in particular London. The UK value given in Figure 4 of around QAR8500 is for a technically assigned license for 2x12.5 kHz in the most congested band/area i.e. UHF and high VHF in London assuming a coverage radius of 15-30km¹⁶. This UK congested value is also almost identical to the UAE value and is equivalent to QAR340,000/MHz. In Qatar, it is proposed to classify all mobile bands below 1 GHz as congested to reflect the growing demand internationally and nationally for spectrum in this range to support growing mobile data traffic. However, in order not to set the fee in these bands at a level greater than that charged for public mobile spectrum, the proposal here is to set a significantly lower level of fees (40% lower) than currently applies in congested parts of the UK or in the UAE, i.e. the proposed fee will be equivalent to a national value of QAR200,000/MHz in congested VHF and UHF bands used by PMR.

¹⁶ The medium congested value for the UK is much lower at £300 i.e. QAR 1710 for a 2x12.5 kHz license which is less than the current Qatar fee of QAR2500. Also the only UK auction result (at 400MHz) gives a much lower value of QAR325 per 2x12.5 kHz but this is not surprising given only limited use of the spectrum sold was possible because of defence use of the band.

Figure 4: Comparison of fees for a single PMR base station with 10 mobiles using 2x12.5 kHz operating in the UHF band



The following frequency bands will therefore be subject to fees based on the equivalent of QAR 200,000 per MHz for a national coverage license (i.e. coverage factor of 6):

- 145-156 MHz
- 165 – 174 MHz
- 410 – 430 MHz
- 450 – 470 MHz

Note that since an individual fee is no longer applied for each mobile device and the bandwidths assigned to PMR licenses tend to be relatively small, the impact of the proposed new fees on most PMR licensees will be to reduce substantially the fee paid by the licensee.

4.3.3 Fees for the VHF aeronautical and maritime mobile communication bands

The Gulf region is a major international hub for both aviation and shipping as well as being a major producer of offshore oil and gas. This places a particular heavy demand on the internationally coordinated VHF frequency bands used to provide essential communications to aircraft, ships and offshore platforms. It is therefore proposed that the following frequency bands will be treated as congested for fee setting purposes:

- 118 – 137 MHz (aeronautical mobile)
- 156 – 165 MHz (maritime mobile)

The fees for these bands will be set on the same basis as other congested frequency bands below 960 MHz, i.e. based on the equivalent of QAR 200,000 per MHz for a national coverage license (i.e. coverage factor of 6).

Question C14. Do you have any comments proposals for fees in congested bands used by FM radio, aeronautical and maritime services and PMR services at VHF and UHF? Please provide evidence to support your views.

Annex D – Summary of Consultation Questions

Questions proposed in the core document:

Question 1	Do you agree that spectrum fees should as a minimum cover the costs incurred by ictQATAR?
Question 2	Do you agree with the principle that license fees in bands where demand for spectrum is likely to exceed the available supply should reflect the opportunity cost associated with using that spectrum?
Question 3	Do you consider the structuring of the, CB, test and development, amateur, aircraft and ship station licenses to be appropriate? If no, please explain your reasons.
Question 4	If yes, is the proposed size of the fees appropriate?
Question 5	Do you agree that, where practical, spectrum fees should be related to the frequency band used, quantity of spectrum licensed, coverage area and duration of use?
Question 6	Do you agree with the proposal to apply a minimum spectrum fee of QAR500 per annum to all Radio Spectrum Licences?
Question 7	Do you agree with the above approach to taking coverage into account in calculating the Radio Spectrum Fee? If no, please explain your reasoning and suggest an alternative approach.
Question 8	Do you agree with the proposal to apply a flat rate spectrum fee of QAR500 per link to links operating above 40 GHz, irrespective of the bandwidth assigned? If no, please explain your reasoning.
Question 9	Do you agree with the proposed approach to calculating Radio Spectrum License Fees for a period of less than one year? If no, please explain your reasoning and suggest an alternative approach.
Question 10	Do you have a view on the levels of Radio Spectrum License Fees? Please explain the reasons for any views that you express.
Question 11	Do you agree with the proposal to provide 12 months' notice of changes to the Schedule of Radio Spectrum Fees?
Question 12	Do you agree with the proposal to review the Schedule of Radio Spectrum Fees at five year intervals?

Questions proposed in Annex C:

Question C1	Do you believe that the proposed formula for setting Radio Spectrum License Fees is appropriate? If not, please explain your reasoning and propose an alternative approach.
Question C2	Do you think that the proposed Frequency Band Factor (FBF) values are appropriate for use in the formula for setting Radio Spectrum License Fees? If not, please explain your reasons and propose an alternative approach.
Question C3	Do you think that the proposed Coverage Factor (CF) values shown in Tables 2 and 3 are appropriate for setting Radio Spectrum License Fees for PMR/TMR systems? If not, please explain your reasons and propose an alternative

approach.

- Question C4** Do you think that the proposed Coverage Factor (CF) values are appropriate for setting Radio Spectrum License Fees for Scanning Telemetry and SCADA systems? If not, please explain your reasons and propose an alternative approach.
- Question C5** Do you think that the proposed Coverage Factor (CF) values are appropriate for setting Radio Spectrum License Fees for Satellite Earth Stations? If not, please explain your reasons and propose an alternative approach.
- Question C6** Do you agree with the proposed Coverage Factor (CF) value of 1 for individually licensed fixed links? If not, please explain your reasons and propose an alternative approach.
- Question C7** Do you think that the proposed Coverage Factor (CF) values are appropriate for setting Radio Spectrum License Fees for point to multipoint fixed links? If not, please explain your reasons and propose an alternative approach.
- Question C8** Do you think that the proposed Coverage Factor (CF) values are appropriate for setting Radio Spectrum License Fees for broadcasting transmitters? If not, please explain your reasons and propose an alternative approach.
- Question C9** Do you think that the proposed Coverage Factor (CF) values are appropriate for setting Radio Spectrum License Fees for radio determination stations? If not, please explain your reasons and propose an alternative approach.
- Question C10** Do you have any views on the proposed approach to setting the Time Factor (TF) values to be used in the formula for setting frequency and spectrum license fees? Please explain the reasoning behind any comments that make.
- Question C11** Do you have any views on the proposed base value (BV) value to be used in the formula for setting frequency and spectrum license fees, or on the approach adopted in setting this base value? Please explain the reasoning behind any comments that make.
- Question C12** Do you have any comments on ictQATAR's conclusions regarding the bands that are identified as being congested in Qatar? Please explain the reasoning behind any comments that make.
- Question C13** Do you have any comments on ictQATAR's proposals for fees in congested bands used by public mobile services? Please provide evidence to support your views.
- Question C14** Do you have any comments proposals for fees in congested bands used by FM radio, aeronautical and maritime services and PMR services at VHF and UHF? Please provide evidence to support your views.