Ministry of Cabinet Affairs

Resolution No. (4) of 2008 with respect to the Approval of Spectrum Planning and Allocation Policies

Minister of Cabinet Affairs – Minister responsible for the telecommunications sector:

After perusal of:

The Telecommunications Law promulgated by Legislative Decree No. (48) of 2002,

Pursuant to the Articles of Chapter 9 concerning radiocommunications, of the Telecommunications Law promulgated by Legislative Decree No. (48) of 2002,

The Law No. (83) of 2006 with respect to the Approval for the Kingdom of Bahrain Joining the Treaty on the Distribution of Signals Carrying a Program which are transmitted by Satellite, which was signed in Brussels on 21 May 1974,

Decree No. (1) of 2008 with respect to Naming the Minister responsible for the Telecommunications Sector,

The Resolution No. (8) of 2008 with respect to the Approval of the Second National Telecommunications Plan, promulgated by the Council of Ministers,

And on the basis of the report of the bodies concerned with telecommunications regulation concerning the Spectrum Planning and Allocation Policies,

The following is decided:

The First Article

The Spectrum Planning and Allocation Policies attached to this Resolution shall be approved.

The Second Article

The concerned parties in the telecommunications sector shall, each according to its authority, implement the Spectrum Planning and Allocation Policies in the commercial and non-commercial fields in the Kingdom of Bahrain and submit

periodic reports on the activity of the relevant sectors to the Minister responsible for the telecommunications sector with highlighting the results reached by such parties and proposing appropriate solutions for the difficulties they may face.

The Third Article

This Resolution shall take effect on the date of its publication and shall be published in the Official Gazette.

Minister of Cabinet Affairs
Minister responsible for the telecommunications sector
Ahmed bin Attiyatalla Al Khalifa

Issued on: 7 Shawwal 1429 H.
Corresponding to: 6 October 2008

Spectrum Planning and Allocation Policies

1. Introduction

Spectrum is a finite but non-exhaustible resource which is a vital input into an ever widening range of services. The usefulness of radio spectrum depends crucially on the management of interference from competing users. This has been and will continue to be, the primary role of the party responsible for radiocommunications but the benefit to the economy derived from the use of radio spectrum also depends on the ability of the system to accommodate shifting demands for spectrum use driven by technology developments and consumer preferences. In addition, society derives value from spectrum use by a wide range of public services, from defence to broadcasting, whose reasonable demands for spectrum have to be accommodated within any spectrum management regime.

The regulatory framework for management of the radio spectrum resource in many ways reflects the historical progress of radiocommunications over the decades. The international regulations detailed in the ITU (International Telecommunication Union) Radio Regulations contain decisions from the earliest days of radio. Over time the national and international frameworks have been amended to enable new uses of the radio spectrum. As a consequence of history and technical evolution, national and international frameworks are an organised patchwork of different generations of regulations and solutions. Until the ITU amended the Radio Regulations process in the mid 1990s, general changes to the regulations took place every 20 years, reflecting the concept that the regulatory environment would remain stable for long periods of time. This made it increasingly difficult for new generations of radio technologies to gain access to the spectrum resource at the global level. Nowadays ITU conferences take place every 2 or 3 years, which eases the situation for new requirements.

The regulations of the radio spectrum can be portrayed as a three layered pyramid, where the three layers of regulation are global, regional and national. At the global level, the framework is governed by the ITU Radio Regulations (RR). The Radio Regulations provide an overall global framework for the use of spectrum. In the RR, the radio spectrum is allocated to certain applications or services, examples are fixed, fixed-satellite, mobile, broadcasting or radionavigation. The RR has the status of an international treaty, thus national administrations generally comply with its terms. The main application of the RR is in national border areas and space radiocommunications to ensure that the use of the radio spectrum and orbital resources in one country does not cause interference to users in another country. These criteria provide a degree of flexibility in the use of radio spectrum provided that interference is not caused to the radiocommunications services of another country.

At the regional level, the key organisations for Bahrain in respect of spectrum management matters are the Arab Spectrum Management Group (ASMG) and the Gulf Co-operation Council (GCC).

2. Spectrum Management

Spectrum Management is a generic term incorporating frequency management (planning and allocation), assignment of frequencies and individual licensing, national and international co-ordination of frequencies, international representation, administration including the setting of regulations as well as cost recovery charges and spectrum fees for licences, enforcement and control of regulations, spectrum engineering and the setting of standards for radio transmitting equipment, and spectrum monitoring.

At the highest level, effective management of the radio spectrum involves the need to reconcile the interests of the many different categories of spectrum users, and to balance commercial and public policy objectives. Spectrum users include:

- Major commercial users
  - Public network operators,
  - Privately provided business systems,
  - Commercial radio and television broadcasting,
  - Maritime and aeronautical services;
- Major non-commercial users
  - Defence,
  - Science, Radio Astronomy
  - Public Services, e.g. Police, Fire and Ambulance,
  - Users of short range devices,
- Other non-commercial individual users
  - Radio Amateurs and Citizens' Band.

The need to balance the very different spectrum needs and interests of all of the above makes the spectrum management policy both a key instrument and a very complex matter. In addition to a global spectrum management mission statement, policy on spectrum management must contain policy elements covering each of the following:

- planning and allocation;
- spectrum engineering;
- assignment;
- licensing;
- pricing;
- monitoring, enforcement and control; and
- international coordination.

The policy on spectrum management will never stand alone and this is illustrated emphatically by the elements concerning spectrum allocation as these will need to be consistent with the policies of other sectors where the use of spectrum is essential for the execution of sector functions. The most significant sectors to mention in this context are:

- Telecommunications;
- Broadcasting;
- National Defence, Security and Public Order functions; and

- National and International Transportation systems

The interaction between the spectrum allocation policy elements and the many spectrum users, in the national and international context, is one of the key elements in the elaboration of the national frequency plan. This should reflect the requirements of Bahrain and the international, regional and national conditions or requirements of any relevant and applicable legislation.

This document presents the spectrum management policy for the Kingdom of Bahrain. The policy is presented under each of the major headings listed above and is supported by explanatory text which describes the background and international best practise which lead to the objectives and policies proposed.

3. Spectrum Management Mission

In order to maximise the efficient and effective use of the radio spectrum by all sectors of society, the following mission statement has been adopted for Spectrum Management in Bahrain:

Management of the radio spectrum in Bahrain has the overall goal of creating a predictable environment for current and future spectrum usage, which is in the public interest.

3.1 Supporting Objectives

The objectives of the spectrum management process in Bahrain are to:

- Develop policy with regard to the strategic planning of the radio spectrum in Bahrain taking into consideration amongst other things, defence, economic, education, emergency, free and fair competition, freedom of expression, health, national security, public interest, safety, scientific, cultural, social and technical aspects of governmental policies as well as the various interests of radio spectrum users, with the aim of optimising the use of radio spectrum and of avoiding harmful interference;

- Ensure the effective implementation of radio spectrum policy in Bahrain to ensure the availability and efficient use of radio spectrum;

- Ensure the views and requirements of users and other interested parties are taken into account on relevant issues through consultation processes;

- Ensure the timely provision of information to stakeholders and users concerning the allocation, availability and use of radio spectrum in Bahrain;

- Ensure the effective representation of national interests at international negotiations regarding radio spectrum use;

- Review legislation in force from time to time to ensure it remains relevant and supportive of the needs of the spectrum management process; and

- Ensure compliance with Government policies and objectives.

4. Planning and allocation

4.1 Description

Allocation (of a frequency band) means an entry in the National Frequency Plan (NFP) of a given frequency band for the purpose of its use by one or more terrestrial or space radiocommunication services or the radio astronomy service under specified conditions.

Allocations in the NFP are based inter alia on the international service designations specified by the International Telecommunication Union (ITU). Such service allocations may be further sub-divided into band designations for management by the party responsible for radiocommunications and may also provide an indication of major utilisations and any applicable channel arrangements, standards or other pertinent information.

4.2 Background

As well as burgeoning telecommunications and developing broadcasting sectors, in common with many countries Bahrain has a significant governmental sector which uses and demands significant amounts of prime radio spectrum. Careful planning and allocation of radio spectrum is therefore necessary in order to ensure that the radio spectrum is as widely available as possible.

4.3 International Best Practise

Assessing current and future demand requires a forward-looking assessment of those markets which form the major spectrum users. It is important to consult with key sector players and stakeholders in order to understand their plans and requirements for access to radio spectrum in the immediate and longer terms; longer term planning is key to assisting with the development and introduction of new technologies and radiocommunications services. Consultative processes, often involving a 'spectrum review' have been performed on national or regional bases. Publishing the results of consultations and future planned spectrum releases facilitates transparency and helps to provide potential users, importers and manufacturers with a predictable spectrum planning and allocation regime.

National frequency allocation tables are generally based on Article 5 of the ITU Radio Regulations (RR), although minor national variations may sometimes occur. However, national tables usually further clarify the user (or users) to whom the bands are allocated. Thus, they comprise the frequency bands of the RR and identify specific sub-band use where there are several users of a given service. The published versions of these tables are almost always only summary outlines stating whether the user is a Government Department or public user. Specific assignments used by the Armed Forces are virtually never mentioned although reference is often made to non-civil or

governmental use with some indication of the overall application e.g. tactical mobile, weapon systems radar, professional mobile radio, private point to point links etc.

4.4 Objectives

The objectives of the planning and allocation process are to ensure that adequate spectrum is available to:

- Satisfy the requirements of international obligations and treaties;
- Support economic growth and create employment;
- Satisfy the spectrum requirements of sector members including those responsible for national security and defence;
- Meet the needs of civil aviation and the maritime industries;
- Support the introduction of more spectrally efficient technologies, including the timely introduction of digitised broadcasting networks;
- Provide for competitive telecommunication infrastructures through free and fair processes;
- Introduce future generations of public and private mobile technologies;
- Satisfy the spectrum requirements for internationally provided radio navigation services e.g. Galileo and GPS;
- Facilitate the rollout of broadband telecommunications networks;
- Facilitate regionally and globally harmonised frequencies for the PPDR (Public Protection and Disaster Relief) system, in order to help rescue and emergency teams communicate with each other,
- Stimulate technological innovation and competitiveness in a technology neutral fashion;
- Introduce new spectrum management techniques, where appropriate e.g. spectrum commons and spectrum property rights and trading etc;
- Provide spectrum for rural telecommunications with a particular emphasis on the provision of spectrum for telecommunications services for educational (including art and culture) and other public interest (including health and emergency) purposes,

4.5 Policies

1. The party responsible for radiocommunications shall be responsible for overall frequency coordination in the Kingdom. The Spectrum Strategy and Coordination Committee (SSCC) shall be established as the forum at which stakeholders shall cooperate in order to facilitate coordination of spectrum requirements and to support the development and maintenance of the National Frequency Plan (NFP) for all radio spectrum resources in the Kingdom. The party responsible for radiocommunications shall chair the SSCC.

2. The National Frequency Plan Maintenance Group (NFPMG) shall be established under the SSCC as the body, which operationally undertakes the maintenance of the NFP;

3. The NFP shall reflect international obligations and national policy on the use of the radio spectrum (in support of the broader objectives for the telecommunications sector);

4. The form and content of the NFP shall be reviewed and revised periodically to ensure that it meets the needs of spectrum users and service providers, as well as manufacturers and importers and is consistent with current international and national use of spectrum;

5. Adequate spectrum shall be available for new technological developments in such a way as to support technology neutrality;

6. Through the mechanism of the SSCC, radio spectrum use shall be rationalised in order to establish (as far as possible) spectrum bands for the exclusive use of major stakeholders (for example exclusive government and civil bands). The detailed management of such bands shall then be the responsibility of the individual stakeholders (for example, TRA shall manage the civil telecommunications spectrum bands). However, individual stakeholders may delegate[1] all or part of the spectrum management process.;

7. Individual out of band frequency assignments shall be coordinated and approved by the SSCC (for example Government assignments in civil spectrum and visa versa);

8. The SSCC shall respond to requests for advice and assistance from stakeholders as required;

9. Adequate spectrum provision shall be provided to support emergency services and designated telecommunications services in the case of a national emergency, or in the case of natural and man-made disasters;

10. An appropriate re-farming or spectrum transfer policy shall be adopted for circumstances where there is a justified requirement to transfer the use of a

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frequency band to another use e.g. from civil to defence or vice versa, or from one civil user to another; and

11. Spectrum shall be managed as to make it as widely available as possible and to optimise the efficiency of use of radio spectrum: Systems which seek to employ low power, minimise interference to other users and which do not require additional protection from other users shall therefore be viewed favourably.

5. Spectrum Engineering

5.1 Description

Spectrum engineering includes the evaluation of information, capabilities and technology choices to support decisions affecting the allocation, allotment and assignment of radio spectrum. Identifying solutions to interference problems and technical compatibility among radio systems are key areas of focus.

A spectrum engineering function should develop technical guidelines, procedures and administrative instructions for radio spectrum usage as well as compatibility and sharing criteria for the efficient use of radio spectrum by various radiocommunications systems and services. It should also provide technical input to the licensing and pricing functions.

Effective spectrum engineering is a key element in raising the technical efficiency of spectrum allocations and assignments and thus maximising access to and usage of this vital resource. Spectrum engineering becomes especially important where there is a need to consider the introduction of new technologies, especially in bands where existing services are operating.

Spectrum Engineering also provides an important input to the development of frequency planning procedures and guidelines. In addition it also provides the foundation for the formulation of technical policy needed to support spectrum management.

5.2 International Best Practise

Spectrum Engineering is the technical function which supports spectrum management providing analysis and investigation of radio spectrum matters. Typically such analysis and investigation covers interference and transmitter coverage matters but can also extend to co- and adjacent-channel technology sharing issues and in the 21st century is largely provided through sophisticated computer software which may link together with licensing, geographical, topographical and geomorphologic databases in order to provide real-life as well as theoretical analyses.

5.3 Objectives

The objectives for spectrum engineering are:

- To facilitate the efficient allocation and assignment of frequency bands and frequencies;

- To provide technical guidance on how to minimise interference between radio users especially in adjacent bands, frequencies and orbital positions;

- To facilitate the compatibility of different radio standards utilising the same frequency band;

- To develop suitable and realisable spectrum masks for new and existing services; and

- To produce technical guidelines concerning the use of the radio spectrum.

5.4 Policies

1. Radio interference shall be minimised through the judicious use of spectrum engineering;

2. Appropriate spectrum engineering tools and techniques shall be utilised to ensure the efficient and effective allocation and assignment of radio spectrum;

3. Personnel conducting spectrum engineering activities shall have sufficient radio engineering expertise to deliver effective spectrum engineering solutions; and

4. No decisions regarding spectrum allocation and assignment shall be taken without reference to spectrum engineering issues.

6. Frequency Assignment

6.1 Description

Frequency assignment is the identification of suitable radio frequencies or channels in accordance with national legal and regulatory policies and spectrum engineering principles. Assignments are identified by a National Regulatory Authority (or other Spectrum Management Organisation with delegated responsibility); they specify the precise frequency or channel and technical conditions/parameters associated with the use of the frequency or channel.

An assignment must be supported by an appropriate form of licence before the associated radio equipment can be taken into service.
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6.2 International Best Practise

Frequency assignment is an important activity and is conducted with the knowledge that the radio frequency spectrum is a finite natural resource. Frequencies must therefore be assigned in an efficient and effective manner, using a state of the art spectrum management tools utilising internationally recognised propagation criteria embedded in assignment software, as well as a terrain data base and other administrative data bases.

An assignment is usually associated with a radiocommunication station operating at a specified frequency(s) and location(s) and will have clearly defined conditions associated with it addressing, for example, the maximum power and maximum height and characteristics of the antenna. Authorisation to use the assignment is given through the associated licence which will also mandate the user to comply with the specified conditions.

Frequency assignment activities are ongoing and may take many forms, from the identification of a single frequency in response to a licence application, to the identification of a large number of frequencies for a large radio-based network such as a national telemetry or broadcasting system.

6.3 Objectives

In identifying frequency assignments in Bahrain, the objective will be to:

- Minimise the incidence of harmful interference occurring between licensed radiocommunication stations;
- Maximise the efficient use of radio spectrum;
- Ensure that all assignment (and licensing) records are accurate;
- Utilise the most appropriate frequency assignment and planning tools available;
- Make all frequency assignment rules and guidelines publicly available to aid transparency in decision making;
- Issue frequency assignments in a timely manner and in accordance with published quality criteria, in support of the overall licensing process;
- Ensure that assignment staff understand the various techniques and methods employed in frequency assignment and when they should be used; and
- Place information on specific categories of frequency assignments in the public domain by means of the Internet when ever feasible.

6.4 Policies

1. The process of assigning frequencies shall be open, transparent and non discriminatory for all users subject to the provisions of Decree 48. It shall encourage efficient spectrum use and support the promotion of competition in the telecommunications sector;

2. Frequency assignments for all users shall be in accordance with the NFP (unless otherwise agreed by the SSCC) and clearly defined conditions;

3. Such conditions shall be contained in clearly specified documentation (for example the associated licence or authorisation);

4. State of the art tools and working methods shall be employed in the frequency assignment process;

5. Regular reviews shall be convened to ensure that frequency assignment methods employed maintain the objective of maximising spectrum usage whilst minimising harmful interference to other spectrum users;

6. Frequency assignments shall be revoked if it is determined and agreed within the SSCC that it is in the national interest to reorganise frequency allocations in the NFP. In such cases replacement frequency assignments may be offered; and

7. All licences or authorisations for stations or networks to which frequencies have been assigned may be withdrawn in the case of usage subject to Decree 48 or brought to the attention of the SSCC for other spectrum users, if the radio frequency spectrum provided is not used within a specified period.

7. Radiocommunications Licensing

7.1 Description

A radiocommunication licence is an authorisation granted under law and appropriate regulations to permit use of the radio spectrum. Licensing radio spectrum use is typically an administrative function whereby licences are issued or renewed and spectrum fees and charges collected. Different categories of radio users may be licensed in different ways, especially where there are different information requirements or where there are differing demands for access.

7.2 International Best Practise

There are various types of licences, including individual licences, system licences, class licences, general licences, etc. Whilst some users of spectrum are not individually licensed, as in the case of general or class licences, use of the radio spectrum remains subject to defined technical requirements and conditions specified in the applicable licence document.

The means by which licences are awarded vary from simple administrative processing of applications in the order in which they are received, to complex competitive processes created in order to identify which potential user will either make best use of the radio spectrum or alternatively, who places the greatest financial value on access to the radio spectrum.

Of particular importance given the expansion of mobile telecom services and liberalisation of telecom markets, is the authorisation of spectrum use in connection with licensing the provision of telecommunications services: It is necessary to authorise cellular service providers to use the required spectrum as well as authorising them to provide cellular services. It is important that the regulatory process facilitates the simultaneous granting of licences to both operate a telecommunication service and to use the required radio spectrum. There should be no delays or risks of inconsistent regulatory requirements between the two types of licence. This is also the case for licensing broadcasting undertakings. If two separate licences are required, they should be issued simultaneously.

7.3 Objectives

The objectives of spectrum licensing are to:

- Fulfil legal responsibilities in managing the radio spectrum;
- Assist in minimising the occurrence of harmful interference;
- Clearly document and record the administrative and technical conditions associated with all radio spectrum usage in Bahrain in an uncomplicated and wherever feasible, standardised format;
- Enable access to the radio spectrum to as many users as possible taking into account public interest obligations;
- Simplify licensing processes and administrative intervention wherever possible and thus ensure transparency in the licensing processes;
- Enable market forces to resolve conflicting requirements for access to radio spectrum designated for users subject to the provisions of Decree 48 and to assist in ensuring that the maximum economic benefit is derived from the use of the radio spectrum;
- Introduce on-line licensing and payment processes for appropriate licensing categories as soon as practicably possible; and
- To ensure that access to the radio spectrum is provided in a timely and appropriate fashion.

7.4 Policies

1. Use of the radio spectrum shall be subject to the user obtaining a suitable licence, or authorisation in the case of users which fall outside the terms of Decree 48;

2. Licensing and other forms of authorisation shall provide a means of authorising spectrum use and documenting the specified conditions associated with the use of the radio spectrum;

3. The Licensing regime documented in Decree 48 shall be enforced. Failure of spectrum users to comply with the licensing regime may result in the revocation or non-renewal of a licence, or the imposition of fines or other penalties as permitted in Law;

4. Various methods of licensing shall be available and used as appropriate:

    - Where demand does not exceed supply and the assignment of frequencies is unlikely to constrain the number of applicants for frequencies in that band or the efficiency of use of the band, or where there is no competition for access to the radio spectrum, simple administrative processes shall be employed, for example, first come-first served;
    - Where demand exceeds supply, or where there is competition for access to the radio spectrum, then a market-based spectrum management technique shall be employed unless there are over-riding public interest reasons not to. Market-based spectrum management techniques shall be considered on a case-by-case basis and shall include but not be restricted to: Comparative selection, lotteries and auctions.

5. Licensing processes and conditions shall be developed so as to enable the economic potential of the radio spectrum to be realised to the fullest extent possible; technology neutral licensing and spectrum trading shall be implemented when it is possible to do so without violating other policy objectives;

6. Licences and authorisations for the establishment of radiocommunication stations shall normally be for a specified fixed term, renewable on the anniversary of the date of issue. However, if the licence is associated with the provision of a telecommunications service, any radiocommunication station directly associated with the provision of that service shall be licensed for the same term as the associated telecommunication licence;

7. Light licences or general authorisations shall be implemented for specific categories of uses who utilise non-exclusive spectrum (e.g. short range, low power devices) in accordance with technical regulations concerning frequency of operation and radiated output power; and

8. Administrative processes associated with licensing and authorisations shall be regulatory reviewed in order to simplify procedures (including on-line processes) and to ensure the expeditious process of applications.

8. Spectrum Charges and Fees

8.1 Description

In Bahrain spectrum charges and, where justified, spectrum fees will be levied on users of radio spectrum for civil telecommunications applications (i.e. spectrum managed by TRA within the scope of Decree 48). The policy outlined below elaborates on how and when charges and fees are applied. Users of radio spectrum outside the scope of Decree 48 shall not be liable to pay charges and fees.

8.2 International Best Practise

Licensees who operate in un-congested radio spectrum normally only pay a contribution towards the cost of managing the radio spectrum. Such charges are typically based on the amount of spectrum which they consume or deny to other users (calculated as a function of bandwidth and geographic coverage). In many countries ALL spectrum users contribute to the cost of managing the spectrum.

Economic and market-based spectrum management techniques are only applied in situations where there is congestion (insufficient supply) or scarcity (excess demand) of spectrum. Spectrum pricing is the technical term which refers to the application of economic or market-based spectrum management techniques to set the appropriate radio licence fees in such a manner that the fees reflect the economic value of the spectrum. These techniques are used to encourage efficient use of the spectrum, to discourage spectrum hoarding and to encourage users to migrate to less congested frequency bands.

Spectrum pricing is usually implemented in a number of forms (though there are significant differences between national implementations):

- Administrative Incentive Pricing. Fees are calculated (or more usually estimated) by the regulator. These fees are set at a level to provide incentives for users to make effective use of the radio spectrum. For existing licensees, this is the only method available to take account of congestion/scarcity.

- Spectrum Auctions. Licences are packaged and then auctioned to the highest bidder. Such a mechanism is highly transparent and (in theory) yields the price for the spectrum that the market supports, rather than a price which has been estimated by the regulator.

8.3 Objectives

The objectives of spectrum charges and fees are to:

- Recover the cost of managing the radio spectrum where there is no congestion;

- Encourage efficient use of the radio spectrum;

- Accelerate the migration of spectrum users from one band to another where re-farming is necessary;

- Reflect the socio-economic or market value of radio spectrum where such spectrum can be shown to be congested or scarce;

8.4 Policies

1. The price of a spectrum licence shall comprise two elements; a spectrum charge and a spectrum fee;

2. All users of spectrum within the scope of Decree 48 shall pay a spectrum charge, calculated according to the amount of spectrum consumed or denied to other users (calculated as a function of bandwidth, geographic coverage, spectrum re-use where justified and other such relevant factors);

3. The total of all such spectrum charges shall recover the total of the direct and indirect costs incurred in managing the radio spectrum identified as civil telecommunications spectrum or telecommunications spectrum shared with another Bahraini SMO in the National Frequency Plan. However, in justified cases, the charge for a particular user may be reduced for socio-economic reasons;

4. All users of spectrum within the scope of Decree 48, which is either congested or where there is excess demand/competition for access, shall pay the spectrum fee;

5. The spectrum fee for licences granted to users subject to Decree 48 on an administrative basis shall be set using Administrative Incentive Pricing techniques;

6. The spectrum fee for licences granted to users subject to Decree 48 using a market mechanism (for example an auction) shall be determined by the market (i.e. the successful bid price);

7. Spectrum charges and spectrum fees payable by each category of radiocommunication service or user-group subject to Decree 48 and the means by which charges and fees are calculated, shall be prepared and published in publicly available guidelines;

Radio spectrum used by the Bahrain Defense Forces, the Ministry of Interior and other applications associated with national security shall not be liable to pay spectrum charges and fees. It should also be noted that spectrum allocated to the broadcasting and broadcasting satellite services in the National Frequency Plan on a shared or exclusive basis, is currently not subject to Decree 48, when used for transmissions intended for direct reception by the general public.

9. Monitoring, Enforcement and Control

9.1 Description

The radio spectrum shall not be used without a suitable licence and, further, licensed spectrum users are required to comply with licence requirements and technical rules and regulations. Without effective regulations and enforcement procedures, the integrity of the spectrum management process would be compromised. Radio spectrum monitoring provides a means of responding to and managing complaints and for settling disputes arising from spectrum use. Such complaints and disputes may arise from harmful interference caused by unlicensed spectrum use or spectrum use outside the terms of a licence. It is also possible for poorly designed or incorrectly installed electrical apparatus (non-radio equipment) to cause harmful radio frequency interference. Consideration needs to be given to remedies, enforcement, penalties and other dispute resolution mechanisms.

In the course of conducting exercises to resolve interference problems, the manager of the party responsible for radiocommunications may be required to enter user premises and inspect radio equipment to determine compliance with licence conditions and technical standards. An important aspect of fulfilling these tasks is the requirement under law and regulation to establish the powers, authorities, duties and obligations of the manager of the party responsible for radiocommunications and protection of rights for the public under circumstances where inspection of property is necessary.

Monitoring also plays an important role in verifying actual spectrum use in the 'real-world' and can be used to obtain detailed information on the technical and operational characteristics of radio systems as well as the occupancy of channels and bands. Such measurements can assist in the identification of suitable assignments and in enhancing the efficiency of spectrum use.

Content monitoring of authorised broadcasting stations is conducted by the Ministry of Information to ensure compliance with media legislation.

9.2 International Best Practise

Specialist tools in the form of fixed, mobile, transportable and portable monitoring equipment are essential to effective spectrum monitoring activities. It is vitally important that accurate information on licensed spectrum is available into monitoring activities and that data from monitoring activities can be fed back to the assignment process. Thus both monitoring and assignment activities must have access to common databases of licensed spectrum use; however care must be taken to maintain the integrity of such data.

Concerning enforcement, the key issue is that penalties available must be sufficiently onerous to discourage infringements of licensing conditions, as well as the unlicensed establishment and use of radiocommunications stations. However, the range of penalties available should be appropriate to range in severity of the possible offences. In addition, the SMO must have sufficient powers and resources, possibly with the support of

external agencies, to collect evidence to enable a successful prosecution in a court of law.

9.3 Objectives

The objectives of spectrum monitoring include:

- Ensuring compliance with spectrum management regulations;
- Maximising the benefit of the limited spectrum resource to society;
- The timely resolution of interference problems, particularly to safety-of-life services;
- Identification of possible cases of unauthorised spectrum usage for subsequent investigation;
- The gathering of evidence to support successful prosecution;
- The collection of data on channel and band occupancy to support the assignment process and thus improve efficiency of spectrum use;
- Assessing availability of spectrum for future uses;
- Provision of monitoring data to support ITU activities; and
- Provision of assistance in providing acceptable coverage of public services.

9.4 Policies

1. Appropriate monitoring equipment shall be employed and operated by suitably trained staff from within those spectrum management organisations empowered with monitoring the spectrum;
2. Interference which impedes the correct operation of licensed radiocommunications systems (especially those concerned with safety of life) shall be investigated and resolved expeditiously;
3. Action shall be taken against any unlicensed or unauthorised user of the radio spectrum or user operating outside the terms of its licence or authorisation, with a view to bringing an end to the use and in the case of users subject to the requirements of decree 48, collecting admissible evidence for any subsequent prosecution. Unauthorised use of the spectrum by users not subject to Decree 48 shall be addressed by the SSCC;
4. Proactive monitoring activities shall be planned and carried out in order to support spectrum allocation and assignment activities and thus assist in enhancing the efficiency of spectrum use;

5. An inspection regime shall be adopted to ensure that equipment deployed meets appropriate standards and is installed and operated in accordance with the specified licence or authorisation conditions;

6. Means shall be implemented to ensure that licensed radiocommunications stations are maintained within the limits specified in the guidelines published by the International Commission on Non-Ionizing Radiation Protection (ICNIRP) and that such stations comply with any radiation emission standards adopted and published from time to time by ICNIRP; and

7. Bahrain shall participate in international monitoring activities.

10. International Cooperation

10.1 Description

10.1.1 Global Bodies

Radio waves do not respect national borders and many uses of the radio frequency spectrum in Bahrain may have an impact intentionally or unintentionally outside the country.

Bahrain has a number of international obligations to satisfy in the spectrum management sector. The Constitution, Convention and Radio Regulations (including the Table of Frequency Allocations) of the International Telecommunication Union (ITU) are treaty based and will need to be respected in Bahrain's policy and guidelines.

As well as the ITU, there are two other United Nations specialised agencies of importance. Annex 10 of the International Civil Aviation Organisation's (ICAO) Convention deals with aeronautical telecommunications, including spectrum issues on matters related to the safety and regularity of flight. Similarly the International Maritime Organization (IMO) in its Safety of Life at Sea (SOLAS) Convention prescribes certain mandatory radiocommunications carriage requirements for certain ships dependant on their sea area of operation.

The World Trade Organization (WTO) is also important in terms of market and competition issues in radiocommunications.

10.1.2 Regional Bodies

Bahrain is part of ITU Region 1. Within this region, the League of Arab States (LAS) and the Gulf Co-operation Council (GCC) are tasked with various radio planning aspects for the Middle East.

Planning of the radio spectrum is conducted by Arab States in the permanent Arab Spectrum Management Group (ASMG). In order to enhance co-ordination between Arab countries in Telecommunications, in particular in spectrum issues, the Arab council

of Telecommunications and Information created the ASMG in 2001. Recent advances in technology, for example digital radio systems, fixed and mobile satellite systems, broadband wireless systems and other 3rd Generation mobile technologies are considered by Arab States to require a harmonious regional approach to spectrum utilisation, equipment standardisation and system implementation. The Arab Group comprising of 22 countries possesses a market base, which it believes can be a significant player in deciding World Telecommunication Policies.

ASMG Structure
The ASMG was tasked to manage and coordinate all issues related to Spectrum Management, preparations for World and regional ITU Radiocommunication Conferences, and other matters concerning coordination' between Arab States in the spectrum management field.

The management team of the group consists of a Chairman and 5 Vice-Chairman from the Arab Region.

ASMG Meetings
The Arab Spectrum Management Group has met regularly since its establishment in 2001. During the meetings a number of decisions were taken concerning Arab Administrations' spectrum management matters, WRC preparations, as well as Radiocommunication Assembly, and Regional Radiocommunication Conference preparations.

10.1.3 Sub-Regional Bodies - GCC

The Supreme Council is the highest authority of the Gulf Cooperation Council (GCC) formed of the Heads of Member States of United Arab Emirates, Kingdom of Bahrain, Kingdom of Saudi Arabia, Sultanate of Oman, State of Qatar and the State of Kuwait. Its presidency rotates according to the Arabic alphabetical order of the names of Member States. The GCC Secretariat-General is charged inter alia with preparing studies related to cooperation, coordination, and integrated plans and programmes for joint work. The administrative structure of the Secretariat General consists of a number of sectors including the Telecommunications Bureau in Bahrain.

The GCC Telecommunications Bureau conducts the coordination of assignments between neighbouring GCC countries and engages in the process of resolving cross-border interference cases. GCC in its Posts and Telecommunications Committee establishes co-ordination criteria and procedures and agrees the services or systems that may be coordinated through user or operator groups (e.g. the cellular mobile operators) in conjunction with the GCC Bureau. This is detailed planning and may result in the establishment of Plans in the border areas.

Bahrain must respect international obligations in order to secure the proper use of radiocommunications. As a general rule it is necessary to initiate co-ordination if the station to be licensed is capable of causing interference to a neighbour or if Bahrain requires protection of the service by neighbouring States. As with frequency assignment, much of the demand for coordination activity will be driven by new licence applications; with those users requiring a single frequency generating less of a load than those with a network of transmitters to be licensed. There will also be a need to service incoming requests from neighbouring administrations. Regular bilateral meetings should be

convened with the Spectrum Management Organisations (SMOs) of neighbouring countries to identify and resolve current or potential future problems.

10.2 International Best Practise

The regulation of spectrum use on a global basis is a core responsibility of the International Telecommunication Union (ITU) and, in particular, its Radiocommunication Sector (ITU-R). The mission of the ITU-R sector is, inter alia, to ensure rational, equitable, efficient and economical use of the radio frequency spectrum by all radiocommunication services, including those using satellite orbits and to carry out studies and adopt recommendations on radiocommunication matters.

The ITU's Telecommunication Development Sector (ITU-D) has well-established programmes of activities. These programmes to facilitate telecommunication connectivity and access, foster policy development, assist in regulatory and network readiness, to expand human capacity through training programmes, to formulate financing strategies, and to e-enable enterprises in developing countries. These programmes are designed to address topics of interest to spectrum regulators.

It is important that all ITU members participate in these activities to ensure their views and positions are given a voice on the international stage. Much of the preparation for ITU activities is nowadays carried out in regional bodies. It is thus necessary that LAS administrations are active in the spectrum management committee of the LAS. In the Gulf area it is also important that a harmonised position is developed in the GCC prior to addressing issues throughout the Arab region.

In respect of bilateral and multi-lateral spectrum arrangements where the use of spectrum is harmonized across national borders it is necessary that regulators arrive at appropriate arrangements with their neighbours, not only to secure agreement on the implementation of transmitting stations but to protect receiving stations in neighbouring countries. It is therefore to every country’s advantage to achieve these objectives but in addition to find means to achieve them in the most efficient manner.

10.3 Objectives

The objectives of international cooperation are to:

- Develop proposals and prepare for ITU World Radio Conferences at the national, regional (in GCC/LAS/ASMG) and global (ITU) levels;

- Participate effectively in ITU activities concerning equipment standardisation, spectrum sharing studies and radio wave propagation;

- Participate effectively in other spectrum management related international activities with neighbouring countries, at the regional level (e.g. in GCC, ASMG, LAS) and at the international level (e.g. in ICAO, IMO and WTO); and

- Ensure that international obligations arising from the ITU Radio Regulations are effected e.g. co-ordination and notification of assignments and orbital positions, as appropriate.

10.4 Policies

1. Bahrain's strategy for spectrum management matters shall be developed and agreed in respect of foreign administrations, regional bodies (e.g. GCC and League of Arab States/Arab Spectrum Management Group), International Civil Aviation Organization (ICAO) Arab Region, and International organisations (e.g. International Telecommunication Union (ITU), ICAO and International Maritime Organisation (IMO);

2. In order to advise the Minister responsible for Telecommunications, proposals for delegations to participate in international forums addressing spectrum management activities shall be formulated by the International Planning Group of the SSCC;

3. In revising and maintaining the policies regarding frequencies, due account shall be taken of the need to promote and support the harmonising of spectrum usage within the Region, thus maximising economies of scale and reducing equipment costs for users as well as reducing the likelihood of cross-border interference;

4. All frequency assignments (commercial and non-commercial) capable of causing interference to, or requiring protection from, the stations of other administrations, shall be co-ordinated with the administration concerned; and

5. The ITU advance publication process for space radiocommunication systems shall be monitored to identify at an early stage whether co-ordination should be initiated with the notifying administration.