



The Hashemite Kingdom of Jordan

Telecommunications Regulatory Commission

Frequency Use and Planning Policy

صدرت وفقاً لقرار مجلس المفوضين رقم ٤-١٩/٢٠٠٨ تاريخ ٣/٩/٢٠٠٨

Issued Pursuant to Board of Commissioners Decision No. 4-19\2008 on 3/9/2008

1 General

1.1 Introduction

The Telecommunications Regulatory Commission (TRC) is responsible, under the Telecommunications Law for the efficient management and use of the radio spectrum, one of the key natural resources for Jordan.

The Board of Commissioners of TRC has the duty to set the plan for the Assignment of Radio Frequencies, and to review and amend such plan whenever necessary. The Law requires that the plan shall take into consideration the National Table of Frequency Allocations, the National Plan for Frequency Allocation as well as the policies and objectives related to future uses of the Radio Frequencies in the Kingdom.

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

The radio frequency spectrum is a vital and finite natural resource which is used to support a large number of telecommunication services and applications. Access to radio spectrum is an essential requirement for telecommunications, particularly to the safe operation of air and maritime transport, defence services, emergency and public safety, broadcasting, meteorology and the many private businesses that rely on mobile radio.

One of the most significant users of both

mobile and fixed link radio spectrum are mobile phone services which continue to expand, currently delivering services to over four million subscribers in Jordan.

Wireless communications are also increasingly being used to provide broadband access to the Internet and other on-line services. As part of an initiative to promote more competition in the delivery of broadband, TRC recently awarded broadband fixed wireless access licenses which, it is hoped, will make a major contribution to achieving competition and affordable broadband access, and TRC is studying, in the near future the possibility of licensing radio spectrum for mobile broadband wireless access services.

The “*Statement of Government Policy 2007- on the Information, Communications Technology and Postal Sectors*” put special emphasis on the importance of effective and efficient management of radio spectrum, and specified in paragraph 68 the following set of principles that the TRC will adopt and follow:

- a) *Maintain compliance with international and regional obligations;*
- b) *Promote greatest access to spectrum, while maintaining the essential needs of public services, taking due account of spectrum use commonly adopted across developed countries;*
- c) *Adopt policies that promote competition and the rapid introduction of new services and technologies;*
- d) *Adopt a public consultative approach to the development and maintenance of the civilian portion of the Spectrum Strategy, in conjunction with MoICT;*
- e) *Adopt a transparent approach to all spectrum allocation and assignment*

<p><i>decisions but protecting any overriding privacy or security issues;</i></p> <p>f) <i>Investigate and adopt wherever possible, advanced spectrum management principles, including but not limited to: a technology and service neutral approach to spectrum; spectrum reuse; and spectrum sharing, except where these would be inconsistent with applicable international agreements or would create undesirable effects (e.g. loss of international mobile roaming);</i></p> <p>g) <i>Adopt general authorizations instead of individual licensing wherever possible, including designating specific bands as ‘license exempt’;</i></p> <p>h) <i>Minimize the burdens of gaining Type Approval for radio apparatus, including adopting mutual recognition policies wherever appropriate;</i></p> <p>i) <i>As required by Article 6i of the Telecom Law, ensure the preparation of the tables, plans and registers necessary for the regulation of the radio frequency spectrum in accordance with the Telecommunications Law, and the transparent publication of the portion thereof that is assigned for civilian use;</i></p> <p>j) <i>Price spectrum according to market demand, using auctions and, possibly secondary trading, where appropriate;</i></p> <p>k) <i>Prevent the anti-competitive acquisition or hoarding of spectrum by dominant operators;</i></p> <p>l) <i>Investigate the possible use of private or non-profit Spectrum Management Organizations to act of behalf of groups of users and thereby assist in reducing the burden on the TRC;</i></p>	<p style="text-align: right;">(</p> <p style="text-align: center;">:</p> <p style="text-align: right;">)</p> <p style="text-align: right;">(</p> <p style="text-align: center;">"</p> <p style="text-align: center;">"</p> <p style="text-align: right;">(</p> <p style="text-align: center;">(/)</p> <p style="text-align: right;">(</p> <p style="text-align: right;">(</p> <p style="text-align: right;">(</p> <p style="text-align: right;">(</p>
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<p>m) <i>Respond rapidly to interference complaints and take prompt, but proportionate, steps to remove illegal spectrum use and address other interference issues;</i></p> <p>n) <i>Cooperate with neighbouring states to ensure that mutual spectrum use protects the interests of Jordan’s spectrum users while maintaining good international relations; and</i></p> <p>o) <i>Maintain personnel and institutional capability in the TRC with respect to radio frequency spectrum management</i></p>	<p>(</p> <p>(</p> <p>(</p>
<p>The Policy for Frequency Use and Planning needs to reflect international and regional developments including, for example, changes arising from the World Radio Conferences. It is essential that the regulatory regime for spectrum is able to respond to changes in the demand for and use of spectrum.</p>	<p>.</p> <p>.</p>
<p>1.2 Mission</p> <p>In order to maximise the efficient and effective use of the radio frequency spectrum by all sectors of society, the TRC adopts the following mission statement for its spectrum management role:</p> <p>“The TRC will create a predictable environment for the current and future use of radio spectrum in Jordan, which is in the national interest”.</p>	<p>/</p> <p>:</p> <p>”</p> <p>.”</p>

1.3 Spectrum Management Strategy /

In line with its principal duties, TRC intends to further the interests of citizens in relation to communication matters and to further the interest of consumers in relevant markets, where appropriate, by promoting competition.

Taking into consideration TRC duties related to the spectrum management, securing the optimal use of spectrum, coordination with the concerned parties at the military and security entities to identify civilian and non-civilian spectrum allocation and identifying the future needs of radio spectrum usage and negotiate their release in a timely manner, the Policy for Frequency Use and Planning applies only to the spectrum under TRC control.

In carrying out its spectrum management duties TRC will have particular regard to

- The relevant provisions of the Telecommunications Law and the Statement of Government Policy; •
- Availability of spectrum; •
- Current and future demand for spectrum, and •
- International and regional developments including, for example, changes arising from the World Radio Conferences, or the convergence of mobile, fixed and broadcasting services. •

1.4 Supporting Objectives /

The TRC will assume the following overall objectives to fulfil the mission defined in 1.2

<p>above:</p> <ul style="list-style-type: none"> • Develop policy with regard to the strategic planning of the radio spectrum in Jordan taking into consideration amongst other things, cultural, defence, economic, education, emergency, free and fair competition, health, national security, public interest, safety, scientific, 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 Jordan to ensure the availability and efficient use of radio spectrum; • Ensure the timely provision of information concerning the allocation, availability and use of radio spectrum in Jordan; • Ensure the effective representation of national interests in international negotiations where radio spectrum use affects Jordan's policies and strategic direction; • Provide the Ministry of Information and Communications Technology (MoICT) with information from time to time concerning necessary changes to legislation as a consequence of developments in the sector; • Ensure compliance with the 2007 Statement of Government Policy and associated objectives; • TRC will aim to adopt, as far as possible, a technology neutral approach for spectrum licensing , at the same time the current licensed spectrum bands will be 	<p style="text-align: right;">: (/)</p> <ul style="list-style-type: none"> • • • • • () • •
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subject to any instructions or decisions issued by TRC in this regard.

- In addition, the TRC will build on a number of recent important developments, including:
 - The use of auctions as a mechanism to assign cleared radio spectrum for new services according to the Telecom Law provisions;
 - The continued use of administrative incentive pricing (AIP) as a mechanism to inject market forces into spectrum usage, with prices set across many areas of use and reviewed periodically; and
 - Changes arising from the World Radio Conferences.

1.5 Scope of the Policy for Frequency Use and Planning

The spectrum use and planning policy defines the overall principles of the spectrum management policy in Jordan. Accordingly, the TRC outlines in this document what it considers to be a medium to long term strategy for spectrum. TRC believes that having a spectrum strategy will allow TRC to pursue a coherent long-term policy, and to ensure that short and medium term decisions fit within the framework of an overall objective. By short, medium and long term, TRC means periods of around 2, 5 and 10 years, respectively.

As a strategy, TRC believes that it is important for the efficient functioning of a spectrum market that there is the maximum possible amount of information available and is committed to delivering this. Specifically, TRC recognize that there is a need for further data and for signposting the future developments relevant to each band.

TRC sees that a Statement on Spectrum Policy as providing a basic information hub on which to build, and envisages further enhancements including:

- Providing closer linkages between the National Plan for Frequency Allocation which is still under construction and the updated National Table of Frequency Allocation published at the TRC web site:

www.trc.gov.jo

Home page >Radio Frequency Spectrum > General > Frequency Allocation.

- A notice facility relating to the linkages between the plans and tables and discussions or agreements which may impact the future of the bands, e.g. consideration of a band in an international and /or regional forums;
- Widening the depth and breadth of licensing information available to licensees;

Applying the Spectrum Policy Statement allows:

- Users making long term decisions to do so on the basis of the best information available; and
- Those engaging in market-related activities to have increased certainty about the future availability of spectrum.

2 Frequency Allocation

2.1 Telecommunications Law

Article (3-j) of the Telecom Law provides that the following will be among the duties of the Ministry of Information and Communications (MoICT):

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<p><i>“To provide the necessary facilities to allow the Commission and designated members of the armed forces and security departments to prepare the National Plan for Frequency Allocation and the National Register of Frequency Assignments, maintain these in the Ministry and prepare procedures for the coordination among these parties so as to ensure the optimal use of the of Radio Frequency Spectrum and to prevent harmful interference between frequencies assigned for civilian and military uses.”</i></p>	<p>”</p>
<p>Article (6-i) of the Telecom Law provides that it is the duty of the TRC to:</p> <p><i>“To manage the Radio Frequency Spectrum and to regulate the use of all terrestrial, maritime, aeronautical and space frequencies, including:</i></p> <ol style="list-style-type: none"> <i>1) Preparing and maintaining the National Table of Frequency Allocations.</i> <i>2) Preparing the National Plan for Frequency Allocations and the National Register of Frequency Assignments, in collaboration with the concerned parties in the military and Security entities.</i> <i>3) Maintaining the civilian portion of the National Plan for Frequency Allocations and the National Register of Frequency Assignments, and publishing them to the public.</i> 	<p>”</p> <p>(/)</p> <p>:</p> <p>”</p> <p>:</p> <p>(</p> <p>(</p> <p>(</p> <p>”</p> <p>.</p>
<p>Article (12-a-6) of the Telecom Law provides that the Board of Commissioners of TRC has the authority to:</p> <p><i>“Approve the Commission’s policies, particularly those related to ... and the Allocation and Assignment of Radio Frequency Spectrum ...”</i></p>	<p>”</p> <p>(//)</p> <p>:</p> <p>”</p> <p>.</p>
<p>2.2 Government Policy 2007</p> <p>Paragraph (68-e) of the “Statement of Government Policy 2007 on the Information, Communications and Postal Sectors” provides that the TRC is required by the</p>	<p>/</p> <p>(/)</p> <p>:</p>

<p>Government to:</p> <p><i>“Adopt a transparent approach to all spectrum allocation and assignment decisions but protecting any overriding privacy or security issues”</i></p> <p>2.3 Description of Frequency Allocation</p> <p>As defined by the Telecom Law, Allocation (of a frequency band) means an entry in the National Table of Frequency Allocations (NTFA) of a given frequency band for the purpose of its use by one or more terrestrial or space radio-communication services or the radio astronomy service under specified conditions.</p> <p>Allocations in the NTFA are based inter-alia on the international service designations specified by the International Telecommunication Union (ITU). Such service allocations may be further subdivided into band designations for TRC or military/security agencies, and may also provide an indication of major utilisations and any applicable channel arrangements, standards or other pertinent information.</p> <p>2.4 Objectives of Frequency Allocation</p> <p>The TRC believes that it should, in coordination with other concerned government departments, ensure that adequate frequency spectrum is available to:</p> <ul style="list-style-type: none"> • Satisfy the requirements contained in international obligations and treaties; • Provide infrastructures for competitive telecommunication through free and fair processes; • the rural telecommunications with a particular emphasis on the provision of spectrum for telecommunications services for educational (including art and culture) and other public interest 	<p style="text-align: right;">”</p> <p style="text-align: right;">”</p> <p style="text-align: right;">/</p> <p style="text-align: right;">()</p> <p style="text-align: right;">.</p> <p style="text-align: right;">.()</p> <p style="text-align: right;">/</p> <p style="text-align: right;">.</p> <p style="text-align: right;">/</p> <p style="text-align: right;">:</p> <p style="text-align: right;">•</p> <p style="text-align: right;">•</p> <p style="text-align: right;">•</p> <p style="text-align: right;">)</p> <p style="text-align: right;">(</p>
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<p>(including health and emergency) purposes;</p> <ul style="list-style-type: none"> • Introduce future generations of public and private mobile telecommunication technologies; • Satisfy the spectrum requirements for internationally provided radio-navigation services; • Facilitate the rollout of broadband telecommunications networks; • Ensure the timely introduction of digitised broadcasting networks; • Facilitate the use of regionally and globally harmonised frequencies for the Public Protection and Disaster Relief (PPDR) systems, in order to help rescue and emergency teams communicate with each other; • Meet the needs of civil aviation, and the maritime industry; • Satisfy the spectrum requirements of sector members including those responsible for national security and defence; • 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 etc; • Support economic growth and create employment opportunities ; and • Support the introduction of more spectrally efficient technologies. 	<p>()</p> <ul style="list-style-type: none"> • • • • • • • • • • •
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2.5 Policies of Frequency Allocation /

The elements of frequency allocation policies are:

- 1. The TRC is the lead body in Jordan with respect to developing national spectrum plans and the Jordanian National Table of Frequency Allocations (NTFA); (
- 2. The NTFA reflects international obligations and national policy on the use of the radio spectrum (in support of the broader objectives for the telecommunications sector);) (
- 3. The NTFA in terms of form and content will 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 reflects current international and national use of spectrum; (
- 4. The TRC will seek to ensure that adequate spectrum is available for new technological developments in radio communications in such a way as to remain technically neutral; (
- 5. The TRC will, when requested, give favourable consideration to delegating the detailed management of frequencies used exclusively for defence and national security applications as defined in the NTFA to the sponsoring Government Department; TRC will however retain overall management control of the spectrum and be responsible for the overall efficiency of the radio frequency spectrum; (
- 6. The TRC will respond to the Government's requests for advice and assistance on spectrum management (

<p>issues initiated by the sponsoring military and security agencies;</p> <p>7. The TRC will ensure that adequate spectrum provision is made to support emergency services and designated telecommunications services in the case of a national emergency, or in the case of disasters;</p> <p>8. The TRC will implement an appropriate re-farming or spectrum transfer method for circumstances where there is a justified requirement to transfer the use of a frequency band to another use (e.g. from civil to defence or vice versa, or from one civil user to another);</p> <p>9. The TRC has a general policy of maximising access and optimising the efficient use of the spectrum; it shall therefore look favourably on systems that seek to employ low power, minimize interference to other users, do not require additional protection from other users.</p>	<p>(</p> <p>(</p> <p>)</p> <p>(</p>
<p>3 Frequency Assignment</p> <p>3.1 Telecommunications Law</p> <p>Article (6-i) of the Telecom Law provides that that the following will be among the duties of the Telecommunications Regulatory Commission (TRC):</p> <p><i>“To manage the Radio Frequency Spectrum and to regulate the use of all terrestrial, maritime, aeronautical and space frequencies, including:</i></p> <p>1) ...;</p> <p>2) <i>Preparing the National Plan for Frequency Allocations (NPFA) and the National Register of Frequency Assignments, in collaboration with the concerned parties in the military and Security entities;</i></p>	<p>/</p> <p>(/)</p> <p>:</p> <p>”</p> <p>:</p> <p>..... -</p> <p>-</p>

3) *Maintaining the civilian portion of the NPFA and the National Register of Frequency Assignments, and publishing them to the public.*

Article (34) of the Telecom Law provides that the TRC's Board of Commissioners is entrusted to:

"...,set a plan for the Assignment of Radio Frequencies, and shall review and amend such plan whenever necessary. The plan shall take into consideration the National Table of Frequency Allocations, the NPFA as well as the policies and objectives related to future uses of the Radio Frequencies in the Kingdom"

3.2 Government Policy 2007

Paragraph (68) of the "Statement of Government Policy 2007 on the Information, Communications and Postal Sectors" provides that the TRC is required by the Government to:

*"e) Adopt a transparent approach to all spectrum allocation and assignment decisions but protecting any overriding privacy or security issues;
..."*

3.3 Description of Frequency Assignment

Pursuant to the definition in the Telecom Law, Assignment (of a radio frequency or radio frequency channel) means authorisation given by the Commission for a Radio Station to use Radio Frequencies or a specific radio channel under conditions set by the Commission for this purpose.

Historically, authorization for assignments had been carried out by TRC in the following

<p>two primary forms;</p> <p>a) Form of “General Radio Spectrum License”, where assignment is made to authorize an “Individual Licensee” to use the assigned radio frequency for the provisioning of public Telecom Services and/ or the operation of public telecom networks;</p> <p>More details on this form of radio frequency assignment can be obtained from TRC’s publication under the title:</p> <p><i>“Instructions Regarding the Application Procedures and Conditions for the Issuance of a General Radio Spectrum License for Radiocommunication Systems Related to the Integrated Licensing Regime”.</i></p> <p>The link to these instructions is: www.trc.gov.jo (Home Page > Regulations > Telecom Sector > Regulations > instructions and procedures regarding radio frequency spectrum.)</p> <p>b) Form for other purposes, including; broadcasting, Radio-based transmission links and other radio stations used to support radio-communication systems. In these cases, the assignment is made to authorize the assignee (who is not a Public Telecom Operator having an Individual License under the Integrated Licensing Regime) to use the assigned radio frequency for the specific purpose as defined in the radio spectrum license;</p> <p>More details of these forms of radio frequency assignment can be obtained from TRC’s publications under the title; <i>“Spectrum Licensing”</i></p> <p>The link to these publications is: www.trc.gov.jo (Home Page > Radio Frequency Spectrum > Radio Spectrum Licensing > Spectrum Licensing).</p>	<p>:</p> <p>" " (</p> <p>/</p> <p>:</p> <p>"</p> <p>"</p> <p>:</p> <p>www.trc.gov.jo</p> <p>< <)</p> <p>< <</p> <p>(</p> <p>(</p> <p>:</p> <p>" " :</p> <p>:</p> <p>www.trc.gov.jo</p> <p>< <)</p> <p>.(<</p>
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The assignment of frequencies may also be incorporated in licensing processes which are treated elsewhere in this Spectrum Usage Policy and Planning document. For example a frequency(s) may be associated with a market based award of a licence (Auctioning). Once the process has been completed frequencies will be assigned to the user.

In addition, the TRC’s Board of Commissioners had designated certain bands of the radio spectrum, where any persons may use some equipment or applications utilising any of these specified frequency bands under specified conditions subject to type approval and without licensing them individually. Some telecom regulators identify such bands as “License Exempt”, and for simple reference, we call these bands as “Open Bands”.

Licensing the use of the Open Bands is a form of general authorization which may be implemented along the following steps:

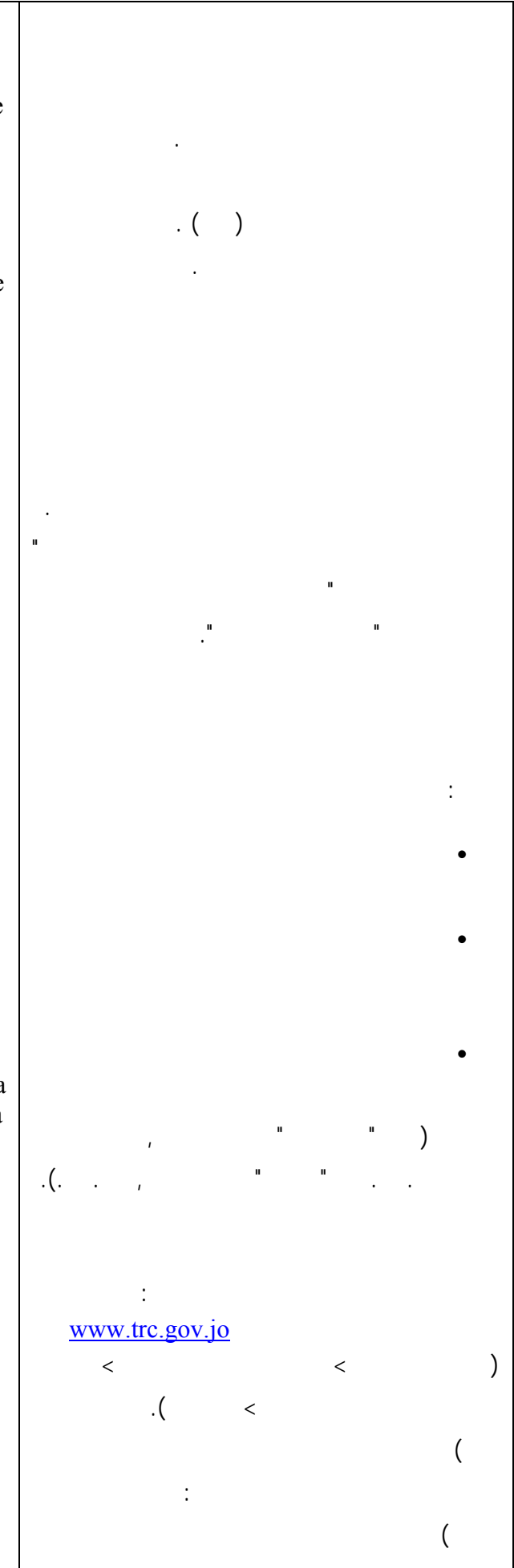
- All users will be governed by type approval of radio equipment;
- Limits will be placed, depending on the type of technology, on the maximum power of the equipment;
- In some cases, open licensing places a limit on the use of the technology to a specific application (e.g, WiFi in the 2.4 & 5 GHz bands, DECT in the 1.9 GHz band).

More details can be obtained from TRC’s web site using the following links:

www.trc.gov.jo

(Home Page > Radio Frequency Spectrum > Radio Stations and Radio Communication Equipment > Guidelines).

- a) Guidelines for Type Approval of Radio Communications Equipment:
- b) General Guidelines for Operating Radio LAN System:



3.4 Objectives of Frequency Assignment

In order to establish an effective assignment regime when a spectrum licence and associated frequency(s) assignment(s) is required, the TRC will :

- Utilise the optimum frequency assignment and planning tools available;
- Ensure that assignment staff understand the various techniques and methods employed in frequency assignment and when they should be used;
- Seek to reduce the incidence of harmful interference occurring between licensed (including legally authorized) radio stations;
- Maximise the efficient planning of radio stations ;
- Ensure that all assignment (and licensing) records are accurate;
- Develop quality criteria to support the frequency assignment in a timely manner in support of the overall licensing process;
- Make all frequency assignment rules and guidelines publicly available to aid transparency in decision making;
- Consider the feasibility of placing information on specific categories of frequency assignments in the public domain by means of the Internet.

3.5 Policies of Frequency Assignment /

The policy provisions for frequency assignment that the TRC will adopt are:

1. The process of assigning frequencies shall be open, transparent and non discriminatory for all users. It shall encourage efficient spectrum use and support the promotion of competition in the telecommunications sector;
2. The formalities concerned with the identification of suitable frequency(s) and the issuing of a specific licence or authorisation and associated frequency assignment in order to enable the user to operate radio stations (i.e. use the radio spectrum) at a specified frequency(s) shall be in accordance with the NPFA and clearly defined licensing conditions;
3. Such conditions will be contained in clearly specified documentation or will be specified in the licences;
4. TRC will ensure that state of the art tools and methods are employed, as appropriate in the frequency assignment process;
5. Frequency assignments will be revoked in justified cases of national interest for security and economical aspects or to reflect any other international commitments to reorganise frequency allocations in the NTFA. In such cases the TRC will offer replacement frequency assignments –were applicable- after consulting with the licensees ;
6. All licences for stations or networks to which frequencies have been assigned may be withdrawn, subject to a decision of the TRC, if the radio frequency spectrum provided is not used within a specified period.

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4 Radio Spectrum Re-farming

4.1 Regulations

The TRC's *"Instructions Regarding the Application Procedures and Conditions for the Issuance of a General Radio Spectrum License for Radio-communication Systems Related to the Integrated Licensing Regime"* provides that:

- a) Article 5.4 *"In order to comply with international radio spectrum coordination requirements, International Telecommunication Union allocations or re-allocations, or generally in the course of regulating the radio spectrum in the best interests of Jordan, the TRC may reassign Radio Frequencies used by the Licensee or require the Licensee to surrender its rights with respect to Radio Frequencies which are not required for the operation of Radio-communication Systems related to the provision of Public Telecommunications Services and/or the operation of Public Telecommunication Networks. In such cases, the TRC and the Licensee shall consult with each other before any such action is taken and the TRC shall provide the Licensee with adequate time and, where applicable, assign appropriate alternative frequencies, to permit the Licensee to carry on its business without unreasonable costs or disruptions"*;

- b) Article 7.1: *"The Licensee shall undertake to compensate the users of frequencies that need to be evacuated in order to enable the assignment of the required frequencies to the Licensee. Such compensation shall be agreed between the Licensee and the said users under the facilitation of TRC and the*

negotiation for the compensation between the licensee and the user(s) shall not exceed 6 months after the user (s) has/have need named . Compensation for the evacuation of such frequencies in no way grants the Licensee or any other party any rights to use the relevant frequencies absent a General Radio Spectrum License issued by the TRC”.

The above mentioned instructions are published on the TRC’s web site and its full text can be obtained by using the link indicated in (3.3-a) above

4.2 .Description of Spectrum Re-Farming

Spectrum re-farming process is the physical process by which a spectrum management authority recovers part of the spectrum from its existing users for the purpose of reassignment, either for new uses, or for the introduction of new spectrally efficient technology. Resolution of all spectrum re-farming issues is necessary before the start of a planning process, to which it is linked, can be successfully completed. Spectrum re-farming commences once a frequency band has been identified for redevelopment and firm proposals exist to either remove the existing occupants, or restructure the band. It is completed when the existing users have agreed to the changes and any associated conditions that may apply (e.g. co-ordination in a replacement frequency band) and the changes have been successfully concluded.

Spectrum re-farming has attracted growing interest in recent years, principally due to a number of developments such as digitalisation and the introduction of third generation mobile telecommunication services. As an example the band 862 - 3400

MHz band in most countries is very heavily used, yet is of growing commercial interest. The introduction of new radio-communications systems such as Digital Audio Broadcasting and 3rd generation mobile telecommunication services (IMT) has led to a requirement to modify the planning and the structure of this and other bands. As a consequence such requirements have had a knock-on effect and in turn have required changes to be made to other services, in particular the fixed service and a variety of military services and systems.

It should however be emphasised that re-farming as such is a long standing and frequently used frequency management tool used for the strategic planning of spectrum usage with the primary objective of securing efficient spectrum use as well as (in many cases) international spectrum harmonisation.

The new element that is brought into the discussion in the context of re-farming is whether and how spectrum re-farming will be funded and the role that administrative incentive pricing and spectrum trading could or should have.

Annex (1) to this document provides more details on the issue of funding the re-farming.

4.3 Objectives of Re-Farming

In establishing an effective process for spectrum re-farming, the TRC will:

- Wherever possible provide an adequate period of notice (3 years at maximum for frequencies that are not primarily used to offer public telecommunication services and five years at maximum for public radio frequency licenses) where a band is to be transferred from one user to another;
- Ensure spectrum is available for the speedy introduction of new technologies

(IMT)

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<p>or services;</p> <ul style="list-style-type: none"> • Avoid the hoarding of spectrum by any entity, which is not utilising the spectrum in the national interest; <p>Determine a fair and equitable solution for compensating existing use of spectrum to reflect the real cost of transfer.</p> <ul style="list-style-type: none"> • Avoid creating a condition within an auction process, where bids for spectrum will be lower as a result of the need to compensate existing users; • Avoid disputes between existing and new users, where TRC has to mediate, which would then lead to additional administrative costs. <p>4.4 Policy of Re-Farming</p> <p>The TRC will apply the following policy provisions for re-farming of radio spectrum :</p> <ol style="list-style-type: none"> 1. Wherever possible TRC will provide a period of notice of not less than 3 years to existing users required to vacate spectrum; 2. Where a speedy transfer is required, new licensees shall compensate existing users to vacate spectrum; 3. Compensation costs shall be calculated in a transparent and equitable manner which reflect the REAL cost of transfer e.g.: <ol style="list-style-type: none"> a. Wholesale replacement of equipment based on actuarial value; b. Additional equipment (e.g. extra radio links); c. Re-tuning of equipment; 	<ul style="list-style-type: none"> • • • • <p>/</p> <p>:</p> <p>-</p> <p>-</p> <p>-</p> <p>:</p> <p>.</p> <p>)</p> <p>(</p> <p>.</p>
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<p>d. Incremental costs for:</p> <ul style="list-style-type: none"> i. New system components (antennas, boards, etc); ii. Upgrades to system/software; <p>4. Payment parameters (i.e. what is to be paid for) shall be determined before the re-farming process is instigated and when possible TRC will ensure all parties concerned are in agreement;</p> <p>5. TRC will ensure an audit is conducted in relation to the compensation cost of the user who is required to migrate to alternative spectrum.</p> <p>6. TRC will verify the existing spectrum users compliance with the agreed evacuation process.</p>	<p>:</p> <p>) -i</p> <p>(.</p> <p>/ -ii</p> <p>) -</p> <p>(</p> <p>-</p> <p>-</p> <p>-</p>
<p>5 Monitoring, Enforcement and Control</p>	
<p>5.1 Telecommunications Law</p>	<p>/</p>
<p>The Telecom Law provides:</p>	<p>:</p>
<p>Article 37-b: “<i>The Commission shall monitor the use of the Radio Frequencies Assigned to the Licensee</i>”;</p>	<p>": /</p> <p>"</p>
<p>Article 59-a: “<i>The Commission shall verify the licensees’ compliance with the license conditions and the provisions of the law, and may take any actions it deems appropriate for this purpose, including:</i></p> <ul style="list-style-type: none"> a) <i>conducting a physical on-site inspection of network locations and telecommunications equipments...</i>” 	<p>": /</p> <p>:</p> <p>-</p> <p>" ...</p>
<p>Article 62: “<i>The Chairperson, or any person authorized by him in writing, shall have the right to enter any place suspected of</i></p>	<p>":</p>

containing unlicensed equipment or networks, or equipment used for jamming telecommunications networks, or where activities contrary to this Law or to the By-Laws issued in pursuance thereof are being conducted. They shall be entitled to search the place,”

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Article 65:

a) *“The Commission shall have the right to trace the source of any radio waves to ascertain the licensing of that source, without this being considered as breach of the confidentiality of communications or violation of the provisions of the laws in force.*

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b) *The contents of the communications intercepted while tracing their source under Paragraph (a) of this Article shall not be spread or publicized. Any employee who spreads or publicizes the content of those communications shall be subject to the penalties provided by Law”*

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Article 80:

a) *Any person who deliberately makes any action to intercept, interfere with, or interrupt Radio Waves Assigned to others shall be punished by imprisonment for a period not less than six months, or by a fine not less than (JD5000) and not more than (JD25000), or by both penalties.*

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b) *Any person who deliberately uses Radio Waves without a license shall be punished by imprisonment for a period not less than one month, or by a fine not less than (JD2000) and not more than (JD5000), or by both penalties”*

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Article 83: “Any person who possesses or operates a Radio Station in contradiction with the provisions of this Law shall be punished by imprisonment for a period not less than one month and not exceeding six months, or by a fine not less than (JD100), and not more than (JD500), or by both penalties”

5.2 Government Policy 2007

Para 68 of the Sector Policy 2007 provide that TRC should:

“m) Respond rapidly to interference complaints and take prompt, but proportionate, steps to remove illegal spectrum use and address other interference issues”

5.3 Description of Monitoring, Enforcement and Control

Spectrum monitoring can be defined as a process of observing the radio frequency spectrum and reporting on its use.

Spectrum users are required to comply with licence requirements and technical rules and regulations. Radio-monitoring is essential supportive tool to enforcing compliance with regulations is enforced by radio-monitoring.

Radio-monitoring and managing the radio spectrum is increasingly complex, while it is getting more and more crowded.

Without effective regulations and enforcement procedures, the integrity of the spectrum management process can be compromised. The regulator needs an appropriate framework and process for responding to and managing complaints and for settling disputes. Attention should to be given to penalties, remedies, enforcement

<p>tools and other dispute resolution mechanisms.</p> <p>The licensing process involves administrative returns to cover TRC’s spectrum management costs as well as spectrum acquisition returns where demand for frequencies exceeds the available spectrum. Unlicensed use of spectrum therefore involves a revenue loss to TRC and/or the state treasury and is therefore not in the public interest.</p> <p>Monitoring facilities can be used to obtain detailed information on the technical and operational characteristics of radio systems. Measurements will usually include frequency being used, transmission power and the spectrum mask of a transmitter.</p> <p>In the course of conducting operations to resolve interference problems, the authorised representatives of the TRC may be required to enter the licensee's premises and inspect radio equipment to determine compliance with licence conditions and technical specifications. An important aspect of fulfilling these tasks is the requirement under law and regulation to establish the powers, authorities, duties and obligations of the spectrum manager/ inspector and protection of rights for the public under circumstances where inspection of property is necessary.</p> <p>5.4 Objectives of Monitoring, Enforcement and Control</p> <p>The Spectrum monitoring activities will be performed by TRC to support the process of spectrum management with objectives that include:</p> <ul style="list-style-type: none"> • Ensuring compliance with national and international requirements and the avoidance of harmful interference; • Protecting national interests when harmonising and coordinating spectrum utilization with neighbouring countries and regional and international 	<p>/</p> <p>/</p> <p>/</p> <p>/</p> <p>•</p> <p>•</p>
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<p>organizations;</p> <ul style="list-style-type: none"> • Determine actual and planned frequency usages and frequency occupancies to improve spectrum efficiency; • Identify possible cases of unauthorised spectrum usage in preparation for subsequent investigation; • Assist in providing acceptable coverage of public telecom services; • Assess availability of spectrum for future uses; • Ensure compliance with spectrum management regulations; • Maximise the benefit of the limited spectrum resource to society; • Resolution of interference problems, particularly to safety-of-life services for existing and potential spectrum users; • Provide monitoring data to support ITU activities. 	<ul style="list-style-type: none"> • • • • • • • • •
<p>5.5 Policies of Monitoring, Enforcement and Control</p> <p>The policies for monitoring, enforcement and control that the TRC will adopt are:</p> <p>Monitoring</p> <p>1. Fixed and mobile monitoring equipment will be utilised by the TRC to ensure radio-communications equipment and/or stations licensed for use in Jordan meet the requisite standards required to maximise the use of the spectrum;</p>	<p>/</p> <p>:</p> <p>(</p> <p>/</p>

<p>2. The TRC will investigate, as appropriate (by self initiative or in response to complaints), interference to licensed radio-communications systems (especially those of a safety related nature), arising from other radio-communication systems, from unintentional radiations or from active electrical and electronic apparatus, equipment and networks, and the affected may provide any available information about the sources of interference;</p> <p>3. Cases of interference will be resolved quickly (particularly in the case of interference to services which are critical to the safety of life);</p> <p>4. A planned series of monitoring campaigns to identify band occupancy and unlicensed usage will be developed and instigated by TRC in order to support spectrum allocation and assignment activities;</p> <p>5. The TRC will participate in international monitoring activities.</p>	<p>) (</p> <p>(</p> <p>) (</p> <p>(</p> <p>(</p>
<p>Enforcement</p> <p>6. The TRC will take action against any unauthorised use of the radio spectrum with a view to collecting admissible evidence for any subsequent prosecution.</p>	<p>(</p> <p>.</p>
<p>Control</p> <p>7. The TRC will ensure that radio equipment deployed in the field meets appropriate standards and is installed and operated in accordance with the specified licence conditions;</p> <p>8. The TRC will ensure that Licensees'</p>	<p>(</p> <p>(</p>

radio stations are within the limits specified by the: *“GUIDELINES FOR LIMITING EXPOSURE TO TIME-VARYING ELECTRIC, MAGNETIC AND ELECTROMAGNETIC FIELDS”*.

The full text can be obtained by using the link indicated in (3.3-a) above .

These guidelines are consistent with the guidelines which are published by the “International Commission on Non-Ionizing Radiation Protection (ICNIRP)”.

6 Radio Spectrum Licensing

6.1 Telecommunications Law

Article (12-a-5) of the Telecom Law provides that the Board of Commissioners of TRC is entrusted to *“ grant the licenses for the use of the allocated and assigned Radio Frequencies”*;

Article (31) of the same Law provides that:

a) *“Subject to the provisions of Paragraph (b) of this Article, no person may use any electromagnetic waves below 3,000 gigahertz transmittable in space without obtaining a license thereto in accordance with conditions specified by the Board”*;

b) *“The Jordanian Armed Forces and Security Departments, in coordination with the Commission, may use Radio Frequencies allocated and assigned for their use without a license, provided that no interference is caused thereby to other Radio Frequencies. The military and security bodies may also*

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<p><i>use other Allocated frequencies, provided that they obtain the approval of the Commission thereto and comply with the same licensing conditions applied to other Licensees, and provided that they do not cause any harm to other users of Radio Frequencies, provided that they will be exempted from licensing fees”;</i></p> <p>c) <i>“Subject to the provisions of any other law that requires the acquisition of a license to operate broadcast services, operators of these services, including radio, television, satellite broadcasting, and reception equipment, must obtain licenses to use the Radio Frequencies assigned by the Commission”.</i></p> <p>Article (37-a) of the same Law provides that:</p> <p><i>“The Licensee should abide by the use of the Radio Frequencies, as well as the conditions and standards on the basis of which the License was given, including the following:</i></p> <ol style="list-style-type: none"> <i>1. The frequencies of radio spectrum Assigned to it;</i> <i>2. The type and specifications of both the antenna and the Radio Station;</i> <i>3. The authorized geographical area for the mobile equipment;</i> <i>4. The site where the antenna shall be erected;</i> <i>5. The qualifications of the person operating the Radio Station;</i> <i>6. Any other technical conditions that may assist in the effective use of the spectrum”.</i> 	<p style="text-align: center;">"</p> <p style="text-align: center;">-</p> <p style="text-align: center;">"</p> <p style="text-align: center;">(/)</p> <p style="text-align: center;">"</p> <p style="text-align: center;">- :</p> <p style="text-align: center;">-</p> <p style="text-align: center;">-</p> <p style="text-align: center;">-</p> <p style="text-align: center;">-</p> <p style="text-align: center;">-</p> <p style="text-align: center;">-</p> <p style="text-align: center;">-</p>
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6.2 License Exempt Spectrum

Paragraph (68-g) of the Sector Policy requires TRC to:

“Adopt general authorizations instead of individual licensing wherever possible, including designating specific bands as ‘license exempt’.

On the other hand, Article (31-a) of the Telecom Law provides that:

“No person may use any electromagnetic waves below 3,000 gigahertz transmittable in space without obtaining a license thereto in accordance with conditions specified by the Board”.

However, based on the relevant ITU recommendations and other international practices, the Board of TRC had established a set of regulations encompassing the conditions and type approval procedures pertaining to the use of low power radio equipment in certain frequency bands. These regulations are considered to be equivalent to “license exempt” concept practiced in some other administrations, and will be called here as “Open Licenses”.

More details about type approvals for low power devices can be found in TRC regulations under the title *“Applications for Type Approval of Radio Stations And Radio Communication Equipment”* at the TRC web site:

www.trc.gov.jo

Home Page > Equipment > Radio Communication Equipment.

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6.3 Description of Radio Spectrum Licensing

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A radio spectrum licence is an authorisation granted under the law and regulations to allow the acquisition and use of the radio spectrum to provide telecommunications services.

Licensing is an administrative process whereby spectrum licences are issued and returns are collected. Different categories of radio spectrum users may be licensed in different ways according to the type of usage.

6.4 Objectives of Radio Spectrum Licensing

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TRC's views on the objectives of licensing are:

- To fulfil TRC’s legal requirement in managing the radio spectrum;
- To document and record the administrative and technical details of all radio spectrum usage in Jordan in an uncomplicated and wherever possible, standardised format;
- To enable usage of the radio spectrum by as many applicants as possible;
- To simplify licensing processes and administrative intervention wherever possible;
- To ensure that access to the right to use radio spectrum is provided in a timely and appropriate fashion.

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6.5 Policies of Radio Spectrum Licensing

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The radio spectrum licensing policies that the TRC will adopt are:

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1. The TRC will ensure that licensees

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<p>comply with the specified conditions contained within their licence(s). Non-compliance with such conditions may result in the revocation or non-renewal of the licence, or the imposition of fines or other penalties as the law allows;</p> <p>2. The TRC will undertake a review of licensing procedures and associated administrative processes in order to simplify procedures and expedite the granting of licences to applicants;</p> <p>3. Spectrum licences for the establishment of radio stations and/or networks will generally be for a specified fixed term (usually one year), renewable on the anniversary of the date of issue. However if the spectrum licence is for the provision of public telecommunication services, the licence period will be identified according to the instructions regarding the application procedures and conditions for the issuance of a general radio spectrum license for radio communications systems related to the integrated licensing regime.</p> <p>4. The open licensing or general authorisation procedures will be applied for specific categories of cases which are utilising non-exclusive spectrum (e.g. short range, low power devices) in accordance with technical regulations concerning frequency of operation and transmitted power.</p>	<p>.</p> <p>(</p> <p>/</p> <p>)</p> <p>(</p> <p>(</p> <p>)</p> <p>(</p> <p>)</p>
<p>7 Radio Spectrum Pricing</p> <p>7.1 Telecommunications Law</p> <p>Article (12-a) of the Telecom Law authorizes the Board of Commissioners of TRC to:</p> <p><i>“17- set the returns the Commission shall receive for licenses and permits”;</i></p>	<p>/</p> <p>(/)</p> <p>:</p> <p>- "</p>

“18- set the returns or charges the Commission shall receive for the services it renders”.

Article (32) of the Telecom Law which provides that:

“the Council of Ministers may authorize the use of public tendering to grant licenses to use the Radio Frequency Spectrum in cases where this method is required to achieve the public interest, provided that the revenues expected from this method shall not be the sole or main reason for the determination of this interest”.

7.2 Government Policy 2007

Paragraph (67) of the Sector Policy requires TRC to:

“develop an approach to spectrum pricing based on market conditions while increasing the diffusion of services which in turn works towards the growth of the national economy, and taking into consideration the different approaches that may be needed for telecoms use (fixed and mobile, public and private), broadcasting and use by public agencies, also taking into consideration the expected immediate revenues from spectrum pricing should not be the main factor for the estimation of those prices ”

Paragraph (68) of the Sector Policy requires TRC to:

“manage the spectrum in an efficient and effective manner, according to the following

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principles:.....

j) Price spectrum according to market demand, using auctions and, possibly secondary trading, where appropriate;”

7.3 Description of Radio Spectrum Pricing

Spectrum pricing depends on the application of economic or market-based spectrum management principles to set the appropriate radio licence prices in such a manner that the charges reflect the economic value of the spectrum. These principles are used to encourage efficient use of the spectrum, to discourage spectrum hoarding and to encourage users to transfer to less congested frequency bands.

Charges payable by the licensees of radio spectrum are made of two main components, namely:

- a) Annual Returns
- b) Acquisition Returns

7.4 Annual Returns

Annual returns is the returns paid yearly by users of frequency. The aggregate value of all annual returns should as a minimum be sufficient to fully recover the operating costs of the frequency management.

Annual returns are set and updated by TRC’s Board of Commissioners using its authorities under the provisions of the Telecom Law. The current annual returns are made in the form of a schedule and published on the TRC’s web site under the title “Spectrum Tariff Formulas and Schedules”. Up to date information on the annual returns of radio spectrum can be accessed using the following

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<p>link to the TRC’s web site:</p> <p>www.trc.gov.jo (Home Page > Radio Frequency Spectrum > Radio Spectrum Licensing > Radio Spectrum Fees)</p> <p>7.5 Acquisition Returns</p> <p>Acquisition returns are the returns that are paid for acquiring the right to use a certain band of the radio spectrum. These returns are usually paid at the time of issuance of the spectrum licence.</p> <p>7.6 Pricing Methods</p> <p>Returns for using the radio spectrum can be set in several methods. The main methods that are used to set these returns include;</p> <ul style="list-style-type: none"> • <i>Administrative Incentive Pricing (AIP),</i> • <i>Auctions (Tenders).</i> <p>Administrative Incentive Pricing (AIP)</p> <p>Administrative Incentive Pricing (AIP) is used as a tool to promote efficiency in spectrum use within a framework of administrative spectrum management. Licences are issued through an administrative process and carry with them an obligation to make payments to the concerned regulator or government agency. AIP licenses are designed to promote efficient spectrum use – not simply recovering the cost to management spectrum. The idea is that if a licensee has unused spectrum, it will choose to return it rather than pay the returns. Also, if a licensee can pay a lower fee by using spectrum more efficiently, that user may adopt more spectrum-efficient operations.</p>	<p style="text-align: right;">:</p> <p>www.trc.gov.jo</p> <p>< <)</p> <p>(<</p> <p>/</p> <p>/</p> <p>:</p> <p>•</p> <p>•</p> <p>()</p> <p>•</p> <p>•</p> <p>-</p>
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The AIP method can be used for pricing both types of returns (annual returns and acquisition returns).

Auctions (Tenders)

Auctioning is applied in special cases under Article (32) of the Telecom Law which provides that:

“the Council of Ministers may authorize the use of public tendering to grant licenses to use the Radio Frequency Spectrum in cases where this method is required to achieve the public interest, provided that the revenues expected from this method shall not be the sole or main reason for the determination of this interest”.

In the case of auctions the returns payable by the winning party are set directly by the market, except where there is an insufficient number of competitors. In such cases only the reserve price is paid. Reserve price is set by TRC.

Auctions have been recently applied as a mean for setting the spectrum prices for the acquisition of radio frequencies for the provisioning of Fixed Broadband Wireless Access (FBWA) services.

Auctions are used only for pricing the acquisition returns.

7.7 Objectives of radio Spectrum Pricing

The objective is to establish a pricing strategy taking into account both components; the annual returns and the spectrum acquisition returns.

The principal reasons why a fee is generally applicable for the right to use radio spectrum include:

<p>i) Promoting efficient use of scarce spectrum resources, where returns serve as a means to ensure that those using the spectrum do not require more than they need to provide a service;</p> <p>ii) To accelerate the migration of spectrum users from one frequency band to another where re-farming is necessary;</p> <p>iii) To reflect the socio-economic value of radio spectrum where such spectrum is to be shown to be congested or scarce;</p> <p>iv) To prepare for the future convergence of telecom services (fixed, mobile and ISP) by making the differences that are currently service specific to become a reflection to the value of the authorized radio spectrum;</p> <p>v) To prepare for the trading of spectrum licences if so decided in future;</p> <p>vi) Recovering the cost of managing the spectrum;</p> <p>vii) In situations, where the demand for a particular part of radio frequencies exceeds the available spectrum, usage returns provide one means of reflecting the scarcity value of this spectrum and can be used as a selection criterion;</p> <p>viii) Other means that are used to reflect the scarcity value of spectrum is to include the application of license obligations such as requirements to provide a minimum level of coverage, linking the award of additional spectrum to the achievement of certain indicators such as network traffic or number of subscribers, or simply restricting the maximum amount of spectrum that one service provider can hold. In practice, a combination of these means would be used.</p> <p>It is important to decide upon the objectives that the pricing policy should achieve. These</p>	<p>(i) تشجيع</p> <p>(ii)</p> <p>(iii) -</p> <p>(iv) ()</p> <p>(v)</p> <p>(vi)</p> <p>(vii)</p> <p>(viii)</p>
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<p>objectives are generally a combination of following principles:</p> <ul style="list-style-type: none"> a- Promoting efficiency in spectrum usage; b- Simplicity and transparency; c- Cost recovery; d- Reflecting market value of spectrum; e- Promoting competition; f- Increasing rural roll out; g- Achieve revenues for the state. <p>7.8 Policies of Radio Spectrum Pricing</p> <ol style="list-style-type: none"> 1. The price of a licence to utilise spectrum shall comprise two main elements, an annual fee and a spectrum acquisition fee. The fee is applicable to all radio spectrum users and should cover, as a minimum, the direct and indirect costs incurred by TRC in managing the radio spectrum taking into consideration motivating the efficient spectrum use. 2. The spectrum acquisition returns should be kept separate from the annual returns. The prime reason being the fact that the basis for determining these returns are different; 3. In general, when an applicant requires the use of a certain band of frequencies and the assignment of such frequencies is unlikely to constrain the number of applicants for frequencies in that band or the efficiency of use of the band, then the spectrum may be made available on a non-competitive (first come, first served) basis, taking into consideration any other 	<p>:</p> <p>(</p> <p>(</p> <p>(</p> <p>(</p> <p>(</p> <p>(</p> <p>(</p> <p>/</p> <p>-</p> <p>-</p> <p>-</p> <p>()</p>
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<p>relevant factors. Where there is likely to be a higher demand than there is spectrum available then the administrative incentive pricing (AIP) or the auctions technique will be used;</p>	
<p>4. In the specific case of radio spectrum that is required for the access network of public wireless telecom services auction will be adopted according to the telecom law provisions. when TRC deems that it is the most appropriate approach for spectrum pricing .</p>	-
<p>5. The TRC will prepare and publish the annual returns payable to license frequency bands for each category of radio-communication service or user-group in accordance with the processes described in the “Spectrum Tariff Formulas and Schedules”. Annual returns shall be easily calculable; based on factors which TRC has the ability to measure and monitor; and shall be equitable and even-handed to all licensees;</p>	-
<p>6. In cases where spectrum pricing methods are applied, prices shall be determined in such a way as to reflect the cost to society and the benefits the public will receive;</p>	-
<p>7. However, the TRC will initiate a discussion and review of the exemption from spectrum usage returns that the military and security agencies enjoy with a view to a possible future revision of the related legislation;</p>	-
<p>8. In the event that a legal review is made and spectrum trading is authorised in Jordan, the TRC will work with all relevant parties to facilitate the smooth trading of spectrum and to secure the accurate maintenance of spectrum assignment records;</p>	-
<p>9. Spectrum trading practices will be</p>	-

introduced as soon as practicable. To further this policy, TRC will on a regular basis review the data in the NRFA to ensure that they are sufficiently accurate to permit the commencement of spectrum trading between defined categories of licensees.

8 Radio Spectrum Engineering

8.1 Description of Radio Spectrum Engineering

Management of the radio spectrum is the combination of administrative, regulatory and technical procedures necessary to ensure the efficient operation of radio-communication equipment and services. The primary goal of spectrum management is to ensure optimal use of the radio spectrum, in social, economic and technical terms.

Radio spectrum engineering includes the evaluation of information, capabilities and technology choices to support decisions affecting the allocation and assignment of radio spectrum.

Finding solutions to radio interference problems and technical compatibility among radio systems are important elements of radio spectrum engineering.

A radio 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 radio-communications systems and services. It should also provide technical input to the licensing and pricing functions.

8.2 Objectives of Radio Spectrum Engineering

The objectives for radio spectrum

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<p>engineering are:</p> <ul style="list-style-type: none"> • To facilitate the efficient allocation and assignment of frequency bands; • To provide technical guidance on how to minimise interference between radio frequencies especially in adjacent bands; • To facilitate the compatibility of different radio standards utilising the same frequency band; • To produce technical guidelines concerning the use of the radio spectrum. 	<ul style="list-style-type: none"> • • • •
<p>8.3 Policies of Radio Spectrum Engineering</p> <ol style="list-style-type: none"> 1. The TRC will continue building up its radio engineering expertise to deliver effective technical solutions; 2. The TRC will continue its procurement of up-to-date radio spectrum engineering tools to support an effective spectrum engineering capability; 3. The TRC will use the appropriate spectrum engineering tools and techniques to ensure the efficient and effective allocation and assignment of radio spectrum; 4. Radio interference will be minimised through the judicious use of spectrum engineering; 5. No decisions regarding spectrum allocation and assignment will be taken without reference to the guidelines and specifications produced by the spectrum engineering function; 6. Benefit from the best international practises in allocating and assigning radio spectrum; 	<p>/</p> <p>-</p> <p>-</p> <p>-</p> <p>-</p> <p>-</p> <p>-</p>

<p>7. Benefit from the results of studies conducted by international standardization bodies.</p> <p>8. Follow up studies carried out by specialized committees in radiocommunication sector at ITU.</p>	<p>-</p> <p>-</p>
<p>9 International Dimension</p> <p>9.1 Telecommunications Law</p> <p>Article 3 of the Telecom Law authorizes MoICT to:</p> <p>...;</p> <p><i>“e- follow up the implementation of the Kingdom’s commitments in international treaties in the telecommunications and information technology sectors”;</i></p> <p>...;</p> <p><i>“f- foster the Kingdom’s interests with states, regional and international organizations, unions, and commissions concerned with telecommunications and information technology; and to oversee the representation of the Kingdom in those forums in cooperation with the Commission, the ministries, and concerned parties”.</i></p> <p>Article 6 of the Telecom Law authorises TRC to:</p> <p>....;</p> <p><i>“ f – to participate in the representation of the Kingdom in meetings, conferences, negotiations and symposiums and other international forums pertaining to telecommunications and information technology “</i></p>	<p>/</p> <p>()</p> <p>:</p> <p>.....</p> <p>- "</p> <p>" .</p> <p>.....</p> <p>- "</p> <p>" .</p> <p>:</p> <p>.....</p> <p>- "</p> <p>" .</p>

9.2 Government Policy 2007 /

Paragraph 68 of the Statement of Government Policy 2007 on the Information and Communications Technology sectors, requires TRC to:

a) Maintain compliance with international and regional obligations; (

...;

n) Cooperate with neighbouring states to ensure that mutual spectrum use protects the interests of Jordan’s spectrum users while maintaining good international relations. (

9.3 Description of the International Dimension /

Radio frequencies extend beyond national borders, so spectrum management requires an in-depth knowledge of, and active involvement in; Regional and global radio spectrum management developments.

Therefore, much of the radio spectrum is planned on the international level and in some cases this constrains how specific frequencies or frequency bands may be used. This is particularly so in the aeronautical, maritime and space sectors, where, because of the global nature of these services, aircraft, ships and satellites must use specific frequencies for navigation and communication purposes. In addition, there are a number of internationally harmonised frequencies for commercial radio systems such as cellular (mobile) phones.

As for the TV and sound broadcast frequency bands have been harmonised for many decades, to facilitate co-ordination between neighbouring countries and the development of consumer markets.

Other parts of the radio spectrum may be used to meet specific national requirements, so long as these comply with the requirements of the ITU Radio Regulations.

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There is a three level regulatory structure governing radio spectrum usage, comprising global, regional and national layers.

Global regulation of Telecommunications is primarily within the specialisation of the International Telecommunications Union (ITU). The Constitution, Convention and Radio Regulations (including the Table of Frequency Allocations) of the ITU are treaty based and will need to be taken into consideration in the Jordanian policy and regulations. In addition to the ITU, there are two other United Nations specialized agencies that have relevance to radio spectrum regulation . Annex 10 of the International Civil Aviation Organization's (ICAO) Convention deals with aeronautical telecoms, including radio spectrum issues on matters related to safety and regularity of flight. Similarly the International Maritime Organization (IMO) in its Safety of Life at Sea (SOLAS) Convention prescribes certain mandatory radio-communications carriage requirements for certain classes of ships according to their sea area of operation. The World Trade Organization is also considered to be important in terms of market and competition issues in radio-communications.

Regional regulation of telecommunications lies within the activities of the League of Arab States (LAS), which is recognized by the ITU. The LAS has created "the Arab Spectrum Management Group – ASMG" and mandated to it the role of coordinating all issues related to spectrum management, World Radio-communications Conferences and other matters concerning coordination's between Arab States in the spectrum management field. The role of ASMG is described in more detail in its web site : www.asmg.ae

The TRC will need to respect Jordan's international obligations, in order to secure the proper use of radio-communications. This is particularly important in the coordination of spectrum use in border areas.

As a general rule it is necessary to initiate co-ordination if the radio station to be authorized is capable of causing radio interference to a neighbour or if Jordan requires protection from interference originating from neighbouring States. Most of the cases that need cross-border coordination will be driven by new licence applications. There will also be a need to service incoming coordination requests from neighbouring administrations. Therefore, regular bilateral meetings should be convened with the radio spectrum management authorities of neighbouring countries to identify and resolve current or potential future problems.

9.4 Objectives of the International Dimension

The objectives of the international dimension are:

- Subject to resource considerations, participate effectively in important ITU activities concerning equipment standards, spectrum sharing studies and radio wave propagation;
- Work within the International and Regional frameworks to ensure that the availability of spectrum and regulatory practices are in line with TRC's objectives, particularly where they bring benefits to consumers in terms of better quality of services;
- Develop proposals to improve co-ordination of frequency assignments with other administrations, through a harmonised regional approach or bilateral or multi-lateral agreements;
- Prepare for ITU World Radio Conferences at the national, regional (in LAS/ASMG) and global (ITU) levels;

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<ul style="list-style-type: none"> • Participate effectively in other spectrum management related international activities, at the regional level (e.g. in LAS) and at the international level (e.g. in ICAO, IMO and WTO); • Ensure that international obligations arising from the ITU Radio Regulations are effected (e.g. co-ordination and notification of assignments and satellite orbital positions), as appropriate. 	<ul style="list-style-type: none"> • •
<p>9.5 Policies of the International Dimension</p> <p>The TRC will adopt the following policy for the international dimension :</p> <ol style="list-style-type: none"> 1. The TRC will develop Jordan’s strategy for spectrum management matters in respect of foreign administrations, regional bodies (e.g. 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. The TRC will continue to take a lead role in establishing appropriate delegations to participate in regional and international forums addressing radio spectrum management activities; 3. In revising and maintaining the National Table of Frequency Allocations (NTFA) and the National Plan of Frequency Allocations (NPFAs), the TRC will promote and support the harmonising of spectrum usage within the Arab Region, thus maximising economies of scale and reducing equipment costs for users as well as reducing the likelihood of cross-border interference cases; 4. All frequency assignments (civil or non-civil)) capable of causing interference to, 	<p>/</p> <p>:</p> <p>-</p> <p>-</p> <p>-</p> <p>-</p>

or requiring protection from, the radio stations of other administrations, will be co-ordinated with the administrations in question;

5. The TRC will continue to follow up the ITU advance publication process for space radio-communication systems to identify at an early stage whether co-ordination should be affected with the notifying administration.

10 Radio Equipment Type Approval and Certification

10.1 Telecommunications Law

Article 6 of the Telecom Law Authorizes TRC to:

...;

“6.k - establish technical rules and standards for the connection of wire line or wireless equipment, including Telecoms Terminal Equipment with the Public Telecoms Networks, and to set the regulation procedures for importing such equipment into the Kingdom, taking into consideration the bases prescribed in the effective Standards and Metrology Law”,

...;

“6.l - grant Type Approvals and to regulate the importation and the usage of Telecoms Terminal Equipment required for individual and private uses, or for use in specific zones, and to monitor such usage”

Article 35 of the Telecom Law provides:

“ Subject to the exceptions stipulated in Article (36) of this Law, no Radio Station may be possessed or used on the territories of

<p><i>the Kingdom or on board vessels or aircraft registered in the Kingdom, unless a licence is obtained thereto in accordance with the provisions of this Law; nor may a Radio Station be entered into the Kingdom unless its entry is allowed by the TRC</i></p>	<p style="text-align: right;">"</p>
<p>10.2 Government Policy 2007</p> <p>Paragraph (68-h) of the Statement of Government Policy 2007 on the Information and Communications Technology sectors, requires TRC to:</p> <p><i>“Minimize the burdens of gaining Type Approval for radio apparatus, including adopting mutual recognition policies wherever appropriate;”</i></p>	<p style="text-align: right;">/</p> <p style="text-align: right;">(-)</p> <p style="text-align: right;">:</p> <p style="text-align: right;">"</p> <p style="text-align: right;">"</p>
<p>10.3 Scope</p> <p>This part of the Spectrum Policy applies to radio equipment in general, but shall not apply to radio equipment that are exclusively used for military, security and civil defence purposes;</p>	<p style="text-align: right;">/</p>
<p>10.4 Description of Type Approval and Equipment Certification</p> <ul style="list-style-type: none"> - Radio equipments are an essential part of the telecommunications market, which forms an important element of the national economy; - Regulations in the form of guidelines, instructions and application forms for type approval of radio equipment have been issued by TRC since quite a long time. Those regulations need regular review to accommodate the expected changes in the sector caused by new technology, market developments and legislations governing telecom networks; 	<p style="text-align: right;">/</p> <p style="text-align: right;">-</p> <p style="text-align: right;">-</p>

<ul style="list-style-type: none"> - The TRC regulatory regime aims at technology neutrality, permitting the bringing to the market and putting into service of radio equipment to take place at the pace of technology and market developments, while encouraging the most efficient possible use, according to the state of the art, of the limited resources of radio frequency spectrum; 		-
<ul style="list-style-type: none"> - Radio equipment can be a source of and /or a victim of interference from other radio equipment; 	/	-
<ul style="list-style-type: none"> - The TRC has exclusive competence in matters relating to type approval, placing on the market, putting into service and right to connect of radio equipment; 		-
<ul style="list-style-type: none"> - Radio equipment must meet certain technical parameters to ensure that they will operate properly within the assigned frequencies and not cause harmful interference to themselves and to other legal users (or suffer harmful interference from other legal users). Such technical parameters can include transmit power, frequency band, antenna gain, etc. Requiring that the equipment meet appropriate type approval tests is the conventional means to achieve this) .(-
<ul style="list-style-type: none"> - Certification of equipment can be a burdensome process, and a number of administrations now delegate the responsibility to manufacturers and certified test houses for certain types of equipment. For a small country like Jordan, it is best to accept equipment which meets other well-established national or international standards (e.g. CEPT, FCC);) (-
<ul style="list-style-type: none"> - Type approval of radio equipment forms an important part of the regulatory process: It provides an important contribution to the establishment of an environment free of harmful interference. Standardisation is increasingly being carried out by international organisations and if 	:	-

appropriate a specific standard can be referenced in the national regulatory database or the National Plan for Frequency Allocations (NPFA). Test results from other countries may, subject to review, also be accepted as the reference for demonstration of compliance with the adopted standards;

- The TRC will use two methods to certify equipment: On a case-by-case basis, the TRC may choose to carry out or to delegate this function to other competent party. However, in most cases, the TRC accepts the international or national certification.

10.5 Objectives of Type Approval and Equipment Certification

The TRC will adopt the following objectives for type approval :

- To maximise the use of the radio spectrum through assuring the technical specification of any equipment used;
- To ensure that radio-communication equipment do not cause harm to the general public or staff using it;
- To ensure that the electromagnetic interference generated does not exceed the levels above which radio-communication or other equipment cannot operate;
- To ensure that radio-communication equipment have a level of immunity to the electromagnetic disturbance to be expected in its intended use which allows it to operate without unacceptable degradation of the level of its intended use;
- To ensure that all radio-communication equipment for sale in the Jordanian market-place conform to the adopted standards;

<ul style="list-style-type: none"> • To ensure that standards are maintained without the need for the assessment of every item of radio equipment entering the country; • To apply an appropriate level of equipment regulation that maintains the need for radio spectrum compatibility whilst allowing equipment to be procured from world-wide markets and thereby delivering economies of scale and benefits to Jordanian citizens; • To ensure that the radio equipment can provide, if so directed by TRC, certain functions required by emergency services; • To ensure, when deemed necessary by TRC, to inter-work via networks with other telecom equipment and connection with interfaces of the appropriate type. 	<ul style="list-style-type: none"> • • • •
<p>10.6 Policies of Type Approval and Equipment Certification</p> <p>The TRC will adopt the following policy for type approval and certification of radio-communication equipment :</p> <ol style="list-style-type: none"> 1. In order to facilitate competition in the supply of telecommunications equipment and to stimulate the availability of a wide variety of radio equipment at affordable prices, the type approval scheme will not place unnecessary burdens on the manufacturers and suppliers of the equipment prior to permitting access to the market. The process will be open, transparent and non discriminatory and support the promotion of competition in the telecommunication sector; 2. In order to streamline the process of gaining type approval, the TRC will endeavour to develop a Policy for mutual 	<p>/</p> <p>:</p> <p>-</p> <p>-</p>

<p>recognition wherever appropriate, with other internationally recognized certifying bodies;</p> <p>3. Considering that the TRC has exclusive competence in matters relating to type approval of radio-communication equipment, The TRC will determine from which other bodies or classes of body it will accept evidence of compliance with the requirements for type approval;</p> <p>4. Radio equipment which comply with the relevant essential requirements will be permitted to be put into service for its intended purpose; However, the construction of radio stations and putting into service of radio equipment will be subject to authorizations from the TRC on the use of the radio spectrum and the provision of the service concerned;</p> <p>5. Where necessary the TRC may apply safeguard measures to prohibit, restrict or require the withdrawal from the market of radio equipment which has caused, or which it reasonably considers will cause, harmful interferences;</p> <p>6. An Electromagnetic Compatibility (EMC) policy will be developed by the TRC in co-operation with other concerned government departments to minimise problems of immunity and interference occurring to radio-communications systems from non radio, active electrical and electronic apparatus, equipment and networks;</p> <p>7. The functioning of the TRC's relevant instructions will be reviewed in due course in the light of the development of the telecoms sector and of experience gained from application of the essential requirements and the conformity assessment procedures.</p>	<p>-</p> <p>-</p> <p>-</p> <p>-</p> <p>-</p>
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Annex 1 – Radio Spectrum Re-farming

The information in this annex is for explanatory purposes and is not binding on TRC

International Best Practise

Re-farming is not a "first choice" activity. The possibility of sharing frequencies and utilising innovative technologies which enable sharing should always be considered first, in order to avoid re-farming whenever possible.

The feasibility of spectrum sharing should be addressed first of all, since sharing generally improves frequency usage efficiency and furthermore avoids costs for existing frequency users (whether compensated in any form or not).

In addition the implementation of a re-farming programme by a spectrum management authority could generate some political difficulties since it may be considered an unwelcome change in the predictability of the spectrum usage environment by some users. To avoid such difficulties spectrum re-farming should generally be considered only as a last resort.

There are two other elements that have an influence on re-farming and the reimbursement of costs and these are time and transparency :

When decisions taken at for example an ITU World Radio-communication Conference (WRC) have a sufficiently long implementation period, decisions on associated band re-farming and the transfer of existing users can be taken by the spectrum management authority without the need for financial compensation. In this case the ITU decision would permit sufficient time for a user's current equipment to operate for a reasonable and economic period of time. However, this is not sufficient; administrations intending to re-farm a certain

spectrum should inform users in a timely and transparent manner, in order that users can plan accordingly.

The issuing of licences for a fixed period of time, related to the investment costs of the network or the equipment, will support such a policy. When the licence is renewed, clauses can be inserted which address any necessary current or future re-farming issues.

Using notice periods and licences with a fixed duration is currently the method that is most frequently used by regulatory authorities.

Transparency in the area of frequency management is also an important element. If users are informed of, for example, any decisions taken that may influence the national frequency table; it may deter them from investing in their networks or systems which could be the subject of subsequent re-farming. This would help to divert funds to the development of new spectrum rather than funding expansion in a band with limited life.

Administrative incentive pricing can also be used to facilitate the re-farming process, by reducing the cost of spectrum to where re-farmed services will be transferred and increasing the cost of spectrum which has to be vacated.

A similar role could be played by a secondary trading market. When it is possible for licence holders to sell their usage rights to others, whose use would be in conformity with the new frequency plan, this could make re-farming more acceptable and easier to accomplish. Furthermore, the question of who pays is solved automatically.

Spectrum Transition Costs

Transition costs can be evaluated in order to compensate the incumbent users of the frequency bands for moving from their current bands to new bands on specific dates or for introducing new technology generation of equipment which should either be

spectrally more efficient or be in the national interest. In some circumstances it may be more appropriate for an incumbent user to transfer to a non-radio (e.g. copper cable or optical fibre) technology, or to a commercially instead of privately provided system.

Two methods for calculating the transition costs can be considered:

- The calculation of spectrum transition costs by defining the residual value of the equipment;
- The calculation of spectrum transition costs through the remuneration of capital expenditure.

Assessment of user costs to vacate a frequency band

Firstly, it is necessary to examine if the use of radio is an essential requirement for an incumbent user occupying spectral resources required for a new application. This would particularly apply to public and private mobile telecommunication network operators or to a strategic defence requirement. The incumbent user in this case would be transferred to an alternative frequency band and the cost would be determined.

Where radio is judged not to be essential, for example fixed point-to-point radio relay links, it is necessary to consider whether the user might be transferred to another frequency band and the resulting cost determined or the user might be invited to utilise a line system, and the costs resulting from such a vacation would also be determined. In principle the cheapest option should be chosen.

The Actuarial Value

This method of calculation takes account of the equipment operational age of the transitioning user, and assesses the actuarial value of the equipment for accounting purposes. The amortisation value is equal to the purchase price of the equipment less the amount due to depreciation.

As a consequence of technological evolution and equipment obsolescence, a frequency band user may have to renew equipment, even though the same frequency band will be utilised. Again an amortisation value can be calculated for such a situation.

To evaluate the total cost of migration requires, in every case, expertise concerning network costs; the calculation is very sensitive to the level of amortisation and to the existing network architecture.

Remuneration of Capital

This method may apply when a spectrum user in accordance with agreed spectrum management policies has planned the vacation of a frequency band. Such spectrum migration requires the user to plan the transition in advance which results in supplementary financial costs. These correspond to the remuneration that must be paid in advance to achieve the vacation of spectrum in the planned time frame. Without the need for migration this user would not have had to sustain this financial burden.

Financial Compensation

When time and transparency cannot solve the issues, because re-farming has to take place at short notice, the issue of financial compensation of existing users arises. There

are a number of options for such a case :

Existing Users Pay

Advantages:

There will be no discussions or disputes concerning the calculation of re-farming costs.

Disadvantages:

The decision of the administration to move users from the band could be subject to a legal challenge.

Experience within administrations

An advance notice period of between 3 and 10 years appears usual, which is dependant on the nature of the services to be transferred and the extent to which changes will incur hardship on the affected users.

Consequentially no financial compensation is usually deemed necessary. This method has been practised in Switzerland and the United Kingdom. It is also possible to use spectrum pricing to support migration.

A typical example would be an identified need to re-farm a sub-band in the UHF range with a 5 year notice to quit period. During this period the licence cost in the form of spectrum returns for the band to which the services would move are lowered, which in turn would support the re-farming process.

The New Entrant Pays for the Migration

Advantages:

- Spectrum is freed when needed for the new service;
- Only the spectrum specifically needed for the new entrant will be freed.

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Disadvantages:

- A new operator may have to pay higher costs for spectrum in one country or even in one region of a country than in another country or region. This could influence competition within a region where spectrum management authorities are attempting to develop equal opportunities for operators.
- When compensation for existing users is a condition within an auction process, the bids for spectrum will likely be lower and re-farming as a result would in practice be paid for by the spectrum management authority.
- Disputes might arise between existing and new users, where the spectrum management authorities have to intervene, which would then lead to additional administrative costs.

Experience among administrations

This system has been used in several countries for particular services where a speedy migration was necessary. This approach was used in Italy and Romania when introducing GSM 1800. In this case the new operators compensated the Ministry of Defence, which made the band available. In Italy the total costs of migrating equipment and users to an alternative band were paid. These costs, although complex to calculate, can be calculated on the basis of objective parameters. If however a cost related to the loss of spectrum is to be paid, an agreement is required between the parties concerned on the parameters to be used for the calculation of theoretical spectrum value.

(GSM 1800)

National Re-farming Fund

Such a fund could be established in various ways. New entrants only might be required to contribute to the fund or it may be financed by all licence holders. It could also be funded by the receipts from auctions or other spectrum pricing methods or directly by the Finance Ministry or by combinations of any of the aforementioned.

Advantages:

Such a fund would make it possible to spread the costs over a large group of contributors. When spectrum-pricing surpluses flow into such a fund these will contribute directly to the spectrum management process.

Disadvantages:

The establishment of such a fund generally requires a change in the Law accompanied by the political will to make such a change. This might be a somewhat lengthy process.

- The management of such a fund could be a burden for the administration.
- The existence of a fund could lead to more claims.

Experiences within administrations:

Countries where re-farming funds have been introduced include Hungary and France.

In France a Commission has been established to provide advice on re-farming issues. The Commission comprises a number of government bodies; the public mobile telecommunications network operators and industry and trade associations with frequency related interests.

The Commission reviews the validity of the claims, decides upon the required level of funding and proposes the method of financing, which it judges to be the most appropriate, whilst ensuring that the funds are used to exert a positive influence on the implementation schedule for spectrum re-farming. The Finance Ministry generally provides the funds that finance spectrum re-farming projects.

In Hungary the surplus from licence revenues and concession returns are transferred to a fund from which the re-farming of frequency spectrum is financed.

The Administration Pays for Re-farming

In this case the costs are paid either by the Finance Ministry or by the spectrum management authority. Therefore taxpayers or licence holders pay for these indirect costs.

Advantages:

There is a large group of contributors e.g. all taxpayers or all licensees.

Disadvantages:

It leads to higher costs for the regulatory authority.

Experiences within administrations:

This is the normal method used in order to solve problems arising from the transfer of users when an insufficient notice period is provided. In 1998 legislation gave the United Kingdom Minister, powers to make grants to encourage spectrum efficiency. One use of these powers can be to make grants to accelerate the process of spectrum re-farming. Individual applications need to be approved by the Finance Ministry and justified on value for money grounds.