هيئة تنظيم الاتصالات
Telecommunications Regulatory Authority

FIXED POINT TO POINT LINKS - LICENSING AND ASSIGNMENT POLICY

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General Information on Fixed (Point-to-Point) Terrestrial Links

1. Introduction

This information sheet highlights key fixed (point-to-point) terrestrial link activities.

2. International Framework

The planning of frequency allocations at the international level is undertaken by the International Telecommunication Union (ITU), a specialised Agency of the United Nations. The ITU Radio Regulations constitute an international treaty to which the Kingdom of Bahrain is bound; they contain a Table of Frequency Allocations in which spectrum is allocated to different radio services, such as Fixed Service (FS) and the Fixed Satellite Service (FSS). Modifications to these allocations can be made only at World Radiocommunication Conferences (WRCs) held approximately every two years; the agenda for each WRC is set at the previous WRC.

Within the ITU-Radiocommunication Sector (ITU-R) a number of Study Groups, Task Groups and Working Parties address detailed technical issues such as system characteristics, interference criteria, inter-service sharing and channel plans. These groups produce ITU-R Recommendations. For the FS, Study Group 5 is the responsible group producing and publishing “F” series recommendations.

Since the Kingdom is located in the same ITU Region as Europe, European spectrum planning is also of interest. Furthermore, the use of European spectrum planning criteria and harmonised equipment standards brings economy of scale advantages to the telecommunications sector in the Kingdom.

European planning is conducted within sub-groups of the European Communications Committee (ECC) - part of the European Conference of Postal and Telecommunications Administrations (CEPT). With the overall aim of European harmonisation, the ECC produces recommendations and decisions on frequency usage. Technical issues are dealt with through the Spectrum Engineering (SE) Working Group.

3. Legal framework and associated policy for authorising spectrum and equipment use

The legal framework and policy pertaining to fixed (point-to-point) terrestrial links in the Kingdom are detailed below.

3.1 Telecommunications Law of 2002 - Licensing

With the exception of radio frequency spectrum used for broadcasting transmissions intended for direct general reception by the public as well as telecommunications networks and spectrum used by the Bahrain Defence Forces and the Kingdom's security organs, the use of radio equipment is subject to equipment approval and frequency licensing by TRA in accordance with Legislative Decree No. 48 of 2002 promulgating the Telecommunications Law.

A frequency licence is therefore required to operate any microwave or millimetre-wave fixed (point-to-point) terrestrial link (see Articles 24 and 43).

3.2 Spectrum pricing

The Telecommunications Law provides TRA with the means to raise licence fees and TRA is required to ensure that telecommunications users utilise the available spectrum efficiently. Licence fees are set out in Regulations made under the Telecommunications Law. The licence fee for a fixed (point-to-point) terrestrial link loosely reflects whether the bands are congested through a simple frequency break point above which spectrum is less costly than below the break point. In future TRA intends to use more targeted pricing mechanisms as a tool to encourage spectrum efficiency and discourage spectrum inefficiency. Any significant changes will be discussed within the RCC and implemented in a reasonable time-frame. For example pricing in specific frequency bands may reflect congestion more precisely and additionally consideration may be given to whether the link site(s) are located in geographical areas designated as congested. As a consequence a link located in the south of the Kingdom may be more cost effective to implement than one located in the north of the Kingdom. Furthermore, incentives may be introduced to encourage licensees to employ specific measures, which lead to a more effective use of the radio spectrum. An example would be the use of antennas with a narrow beam-width as opposed to antennas which may adversely impact spectrum reuse significantly.

4 Developing National Regulations and Standards

The Telecommunications Regulatory Authority (TRA) is currently responsible for formulating national regulations for fixed (point-to-point) terrestrial links, which are subject to the Telecommunications Law, including equipment and antenna approvals as well as licensing and fees policy. The Directorate for Wireless Licensing Frequencies and Monitoring currently undertakes the detailed assignment of frequencies for all point to point links and in doing so coordinates with those spectrum users which are not licensed by TRA (see 3.1 above). All users of point-to-point fixed links are encouraged to adopt techniques to maximise the spectral efficiency of their systems.

5. Minimum path length policy

The choice of frequency band for fixed (point-to-point) terrestrial links depends principally on path length and traffic capacity. To preserve spectrum in the lower frequency bands for longer, high-capacity links (which can be accommodated only in these bands), TRA intends to operate a "minimum path length" MPL policy to select the appropriate frequency band for a given link.

The MPL permitted in each band is listed in the Annex 2. These limits are based on distances below which it would be reasonable to expect a higher band to be used. Any applicant wishing to install a link shorter than the MPL will need to provide a detailed written justification; permission to deviate from the MPL policy will be at TRA's discretion. In the interest of fairness, it is considered necessary to apply these limits to all operators, including those currently managing their own fixed-link spectrum assignments.

Although this policy is primarily intended to apply for new assignments, it is a condition of frequency licences that TRA shall be informed of any changes to stations at either end of the link (for example height of antenna, type of antenna etc.). In such cases TRA will request DWLF&M to examine whether a change or upgrade to station equipment will require a change in the frequencies assigned to the link, in order to comply with the assignment rules currently in force. In the event that major components of the equipment are to be replaced, TRA will require that the equipment to be replaced operates in a band that is compliant with the link length policy.

6. Other measures to facilitate spectrum efficiency

In addition to a minimum path length policy, as mentioned in 3.2 above TRA intends to promote the use of high gain antennas in order to minimise radiation in directions other than in the bore-sight of the antenna. In order to minimise side lobes and ensure a good front to back ratio the use of yagis and parabaloids using grid pack reflectors is discouraged, however antennas using beam shaping techniques may be authorised on a case by case basis. In this regard TRA will consider introducing link tariffs incentivised to promote the use of antennas having high gain and narrow beam-widths, which provide more scope for reusing the spectrum.

In the assignment process cross polar discrimination is also taken into account; a link is therefore licensed with a specific linear (horizontal or vertical) antenna polarisation, unless the applicant requests a specific linear polarisation, which will not impact spectrum efficiency in the locality.

ANNEX 1: General Fixed (Point-to-Point) Terrestrial Link Assignment Considerations

In general, channels shall be assigned in the highest frequency band compatible with meeting the radio planning requirements.

1 Service availability

“Service availability” is the mean propagation availability used to determine the overall link budget. In general, permitted levels are 99.9%, 99.99%, 99.995% and 99.999%. The use of protected (duplicated) equipment is generally a requirement for availability levels greater than 99.99%.

2 Hot standby and space diversity

“Space diversity” (on the receive path) or “hot standby” facilities may be required in certain circumstances to achieve the required service availability level. However, in the interests of spectrum conservation, TRA does not generally permit the use of frequency diversity for standby purposes. Therefore, N+1 systems will not be accommodated. Any additional requirements will be considered on a case-by-case basis.

3 High/low status

An existing site and its surrounding area may be designated “transmit high” or “transmit low” depending on the frequencies currently in use on the site[1]. Details of existing (fixed terrestrial link) radio sites' hi/lo configurations, on a band-by-band basis, will be provided on the TRA website. If a particular transmit/receive configuration is required, the necessary information should be obtained from the website before submitting the licence application. If this is not practicable, or if further clarification is required, please contact TRA.

4 Licensees’ technical considerations

The licensee is responsible for ensuring that radio transmitters do not constitute a radiation hazard. The Licensee shall therefore ensure that emissions from radio stations the operated by the Licensee are within the limits specified in the guidelines published by the International Commission for Non-Ionising Radiation Protection (ICNIRP) and included in Order No. 4 of the year 2009, from the President of the Public Commission for the Protection of Marine Resources, Environment and Wildlife. See also http://www.icnirp.de.

If a licensee does not own the site where the radio transmitter is to be installed, the permission of the site owner must be obtained.

[1] For the purposes of this document a site’s high/low status will apply to any station established between 200 and 500 metres (dependant on the frequency bands deployed at the site) of a designated prime mast or tower or between 200 and 500 metres of any tower associated with a prime mast or tower.

5 Assignment and Licence Procedure

To apply for a licence, the relevant application form must be submitted with full details of the proposed link, including site details, equipment and antenna details. If the form is incomplete, an application may take longer to process and the form may be returned to the applicant for correction.

Legislative Decree No. 48 promulgating the Telecommunications Law requires that no radiocommunications apparatus shall be installed or used in the Kingdom, except under the authority of a licence granted by TRA. Spectrum currently available on a co-ordinated licensed basis is available in the 4, L6, U6, L7, U7, L8, U8, 11, 13, 15, 18, 23, 26, 28, L31, U31, 32, 36, 38, 40, 49, 52, 57 and 80 GHz bands. Applications for these frequency bands must be made using the current application form available from TRA or downloadable from http://tra.org.bh. Details concerning the ITU or other channel arrangements applicable in the Kingdom are provided in Annex 3.

A light licensing arrangement applies at 5.2[2] and 5.8 GHz and may in future be extended to some frequency bands above 57 GHz. A limited number of technical constraints are applicable in these frequency bands. Please refer to http://tra.org.bh for further details. PLEASE NOTE the 5.4 GHz band is NOT available in the Kingdom of Bahrain for civil telecommunications.

5.1 Assign an application reference number

Each application is assigned a unique application number on receipt, enabling TRA to assign job priority and track the progress of links. Applicants will be notified of this number by email. TRA has through experience found that applications covering a large number of links have an increased chance of errors. If an application contains errors, it will be returned for correction by the applicant.

5.2 Validate the application

TRA will validate all applications for completeness before processing. This procedure includes an appraisal of all the link details against service availability, link length, type of service (i.e. analogue or digital including data rate), bandwidth, channel spacing, equipment and antenna specifications, site locations, etc. Once applications have passed validation, they are subject to TRA turnaround targets. If the form is incomplete or incorrect, it will be returned in order that missing or incorrect information can be provided.

5.3 Enter the link's details

Following validation, the link details are entered on the assignment system, enabling the technical assignment process to commence.

[2] The 5.2 GHz band (5150 – 5350 MHz) although allocated to the Mobile Service in the Kingdom, can be used in accordance with the light licensing regime to provide un-coordinated links within buildings, using equipment having a maximum eirp of -7 dBW (200mW).

5.4 Provide a provisional licence schedule

Where possible, DWLF&M will attempt to assign frequencies on the basis of preferred frequency bands/channels, provided such preferences are compatible with existing fixed (point-to-point) terrestrial links and other services and comply with the link length policy and other criteria detailed in this document. TRA will notify applicants of the assigned frequencies as soon as possible; this does not give applicants authority to operate the fixed (point-to-point) terrestrial link(s), but is provided to assist with early equipment procurement and configuration. However applicants are reminded that they should not commence the procurement of equipment until they have received the assigned frequencies from TRA. Possession of equipment shall not constitute a valid reason for TRA to deviate from the link assignment criteria contained herein.

5.5 Co-ordination with other services and organisations

In addition to minimum path length considerations (see Annex 2) the choice of frequency band depends primarily on the nature of the service and whether the spectrum is shared with other services. Shared spectrum requires the different services to be co-ordinated to internationally agreed levels of protection from interference. Furthermore, in some frequency bands co-ordination may be required with similar services operating in the Kingdom of Saudi Arabia or Qatar.

In such cases a significant period of time may be required for obtaining the required frequency clearance.

5.6 Carry out site assessment

In some circumstances the licensee may need to ensure that antennas and masts meet current planning requirements. If the station includes antennas and masts which might constitute a hazard, particularly to aircraft, it is the applicant's responsibility to obtain approval from Civil Aviation Affairs (CAA).

Licensees shall also ensure compliance with any Guidelines issued by TRA in respect of antenna towers and masts belonging to licensed public telecommunications operators. In future this is also likely to require a site registration process.

The potential licensee should also ensure that the frequency assignments are compatible with the local topography and existing radio frequency usage in the vicinity of the transmitter site. Compatibility issues which require assessment include blocking, intermodulation, obstructions etc. Fixed (point-to-point) terrestrial links are less likely to pose a problem if:

- the effective isotropically radiated power (EIRP) is less than 48 dBW;
- the antenna height AGL is less than 30 metres; or
- when mounted to an existing site-cleared structure, the new installation's height does not increase that structure's height by more than 5 metres.

5.7 Issuing the licence

The licence can be formally issued only when the applicable licence fee has been paid.

6 Temporary Use

Temporary licences are intended to facilitate systems that have a limited period of operation. On a conditional basis, such systems may be considered for a temporary use licence. If the application is successful the licence will be issued on an unprotected, non-interference basis for a period of not more than one month. To be certain of receiving a positive outcome, applicants should apply for temporary use licences in a timely manner. See turnaround targets below.

7 Turnaround targets

TRA aims to process applications and dispatch licences for fixed (point-to-point) terrestrial link(s), which do not require international co-ordination within 15 working days.

For fixed (point-to-point) terrestrial link(s) which require international co-ordination TRA aims to dispatch licences within 60 working days. This includes the full process from receipt of valid applications to issue of the licence, inclusive of turnaround times needed for international co-ordination.

Exceptionally and when a justifiable occasion arises, a link not requiring international co-ordination can be given priority over queued applications in order to achieve a very fast turnaround. Such cases might include restoration of telecommunications services in the case of catastrophic failure or provision of telecommunications at an unforeseen event or telecommunications required in response to a national emergency or natural disaster.

ANNEX 2: Minimum Path Lengths (MPL) for Point to Point Fixed Link Bands in km

Band (GHz)	Capacity Minimum Bit Rate (Mbit/s)		MPL (km) [3]
3.7	Low	34, 2x34 &51	24.5
	High	140/155	16
L6	Low	140/155	16
	High	311	16
U6	Low	311	16
	High	622	16
L7 & U7	Low	8, 2x8, 34, 2x34 & 51	15.5
	High	140/155	9.5
L8	Low	8, 2x8, 34, 2x34 & 51	15.5
	High	140/155	9
U8	Low	8, 2x8	15.5
11	High	140/155	7
13	Low	8, 2x8, 34, 2x34 & 51	9.5
	High	140/155	5.5
15	Low	8, 2x8, 34, 2x34 & 51	9.5
	High	140/155	5.5
18	Low	8, 2x8, 34, 2x34 & 51	4
	High	140/155/311	2
23	Low	8, 2x8, 34, 2x34 & 51	4
	High	140/155/311	2
26	Low	8, 2x8, 34, 2x34 & 51	3
	High	140/155/311	2
28	Low	8, 2x8, 34, 2x34 & 51	2
	High	140/155/311	1.5
L31 & U31	Low	8, 2x8, 34, 2x34 & 51	2
	High	140/155/311	1.5
32	Low	8, 2x8, 34, 2x34 & 51	2
	High	140/155/311	1.5
36	Low	8, 2x8, 34, 2x34 & 51	1
	High	140/155/311	1
38	Low	8, 2x8, 34, 2x34 & 51	1
	High	140/155/311	1
40	Low	8, 2x8, 34, 2x34 & 51	-
	High	140/155/311	-
49	Low	8, 2x8, 34, 2x34 & 51	-
	High	140/155/311	-
52	Low	8, 2x8, 34, 2x34 & 51	-
	High	140/155/311	-
57	Low	8, 2x8, 34, 2x34 & 51	-
	High	140/155/311	-
80	High	<5 GHz in each segment	-

[3] Based on 99.999% availability. Receiver sensitivity assumes that systems operate with a BER of 1x10^-6

ANNEX 3

Radio-Frequency channel arrangements for Fixed Service systems

Band (GHz)	Frequency range (GHz)	Recommendations ITU-R F Series	T/R Spacing (MHz)	Channel separation (MHz)	Remarks
4	3.700 – 4.200	382, Annex 1	266	28	Shared with FIXED SATELLITE service (S-E)
L6	5.925- 6.425	383, Annex 3	260	40;20; 10; 5	Congested Band
U6	6.425-7.125	384	340	40; 30; 20; 10; 5	Shared with FIXED SATELLITE service (S-E) (E-S) / Congested Band
L7	7.125-7.425	385	161	7; 14; 28	Shared with FIXED SATELLITE service (S-E) (E-S) / Congested Band
U7	7.425-7.900	385, Annex 4	245	7; 14; 28	
L8	7.9-8.4	386, Annex 3	266	28; 14; 7	Shared with FIXED SATELLITE service (E-S) / Congested Band
U8	8.4-8.5	386, Annex 2	119	14	Uni-directional only, shared with MOBILE (Wireless Camera)
11	10.7-11.7	387, Annex 5	530	7; 14; 28	Shared with FIXED SATELLITE service (S-E)
13	12.75-13.25	497	266	28; 14; 7; 3.5	
15	14.4-15.35	636	490	28; 14; 7; 3.5	Shared with FIXED SATELLITE service (E-S)
18	17.7-19.7	595, Annex 4	1010	27.5; 13.75; 7.5; 5; 2.5; 1.25	
23	21.2-23.6	637, Annex 1	1232	112 ;28 ;14 ;7 ; 3.5	Subject to further consideration
	(22.0-22.6) paired with (23.0-23.6)	637, Annex 3	1008	112 ;28 ;14 ;7 ; 3.5	
26	24.5-26.5	748, Annex 1	1008	112 ;28 ;14 ;7 ; 3.5	

Band (GHz)	Frequency range(GHz)	Recommendations ITU-R F Series	T/R Spacing (MHz)	Channel separation (MHz)	Remarks
28	27.5-29.5	748, Annex 2	1008	112 ;28 ;14 ;7 ; 3.5	
L31	31.0-31.3	746, Annex 7	140	28; 14; 7; 3.5	
U31	31.5-31.8	746	140	28 ;14 ;7 ;3.5	Under study
32	31.8-33.4	1520, Annex 1	812	56; 28; 14; 7; 3.5	
36	36.0-37.0	749, Annex 2	462	112; 56; 28; 14; 7; 3.5	
38	37.0-39.5	749, Annex 1	1260	140; 56; 28; 14; 7; 3.5	
40	39.5-40.5	749, Annex 2	462	112; 56; 28; 14; 7; 3.5	
49	48.5-50.2	746	884	28; 14; 7; 3.5	
52	51.4-52.6	1496, Annex 1	616	56; 28; 14; 7; 3.5	
57	55.78-57.0	1497, Annex 1	616	56; 28; 14; 7; 3.5	
80[4]	71-76 paired with 81-86				Bandwidth of assignments should <5 GHz in either or both segments. The arrangements for sharing this band between government and civil users, requires elaboration.

[4] Until such time as changes to the NFP are considered during 2012 all frequency assignments in this band for licensees subject to the Telecommunications Law will be made on a case by case basis.