



**INFORMATION AND COMMUNICATION  
TECHNOLOGIES AUTHORITY (ICTA)**

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**Document Ref.: ICTA/DEC/01/2005**

**Information and Communication Technologies Authority  
Decision of 19 May 2005 on Spectrum Allocation for  
Broadband Wireless Access Services in Mauritius.**

19 May 2005

## EXPLANATORY MEMORANDUM

### 1. INTRODUCTION

The Information and Communication Technologies Authority has one of its functions under section 18(p) of the Information and Communication Technologies Act 2001, to “*allocate frequencies and manage, review, and, where appropriate, reorganize the frequency spectrum.*” In this context the ICT Authority is issuing this Decision in order to designate the following frequency bands for the deployment of broadband wireless access systems:-

- a. 2.500 – 2.690GHz;
- b. 3.400 – 3.800 GHz;
- c. 5.150 – 5.250 GHz;
- d. 5.250 – 5.350 GHz;
- e. 40.5 – 43.5 GHz.

This decision also designates the 2.400 – 2.4835 GHz for short range Radio Local Area Networks.

The Authority is currently finalising the operational parameters and sharing safeguards pertaining to the 5.470 – 5.725 GHz and 5.725 – 5.850 GHz bands. A subsequent decision will be released shortly by the Authority in that respect (See section 3 for further details).

Wireless Access systems are broadband radio systems that may be deployed either indoors or outdoors. These systems include:-

- Fixed wireless access which may be defined as “*Wireless access application in which the location of the end-user termination and the network access point to be connected to the end-user are fixed*”.
- *Mobile Wireless Access* which may be defined as “*Wireless access application in which the location of the end-user termination is mobile*”
- *Nomadic Wireless Access* which may be defined as “*Wireless access application in which the location of the end-user termination may be in different places but it must be stationary while in use*”

## **2. BACKGROUND**

The ICT Authority has received several expressions of interest and requests for type approval of equipments from:-

- Operators to offer broadband wireless access services to the public;
- Dealers to commercialise broadband wireless access equipment in Mauritius;

Frequency bands for the operation of broadband wireless access (BWA) include the 2.5 GHz, 3.5 GHz, and 5 GHz bands.

With a view to fulfilling its objects under the law and in particular the one set out under section 16(g) of the Information and Communication Technologies Act 2001, which is to “*further the advancement of technology, research and development relating to information and communication technologies through modern and effective infrastructure taking into account the convergence of information technology, media, telecommunications, and consumer electronics*”, the ICT Authority conducted a Public Consultation exercise from 14 February 2005 to 14 March 2005.

The aim of this consultation exercise was to gather the views of operators and the industry at large on the frequency bands which should be opened for the purpose of BWA applications. Several contributions were received at the Authority and following the analysis of same an Open House session was held on 20 April 2005 to present the outcome of the consultation exercise. Following this Open House Session, the stakeholders were given a further week to send their final comments.

The decisions presented in this document are the result of this comprehensive consultation exercise.

## **3. IMPORTANT INFORMATION**

The ICT Authority has earmarked the 5.470 – 5.725 GHz and 5.725 – 5.850 GHz bands for the purpose of offering BWA services in response to the high demand expressed during the consultation exercise. The Authority has also received proposals from stakeholders to review the eirp limit proposed during the open house session for the 5.725 – 5.850 GHz band upwards. The Authority, taking into consideration the operation of radiolocation radars in the 5.4 – 5.9 GHz band in Mauritius, is currently studying the possibility of operating BWA devices in the 5.8 GHz band at higher eirp and is also finalizing the technical parameters for the sharing of the abovementioned bands between radiolocation radars and BWA devices. A separate decision will be released shortly with respect to these two frequency bands.

**ICT Authority Decision  
of 19 May 2005**

**on Spectrum Allocation for Broadband Wireless Access Services in Mauritius.**

**(ICTA/DEC/01/2005)**

The Information and Communication Technologies Authority in exercise of its statutory functions under the Information and Communication Technologies Act 2001 as amended issues the following Decision pursuant to section 17(3) combined with sections 18(p) and 16 (g) of the said Act. This decision shall come into force with immediate effect.

**A. Decisions on provision of Broadband Wireless Internet Access Services by Internet Service Providers (ISPs)**

The Information and Communication Technologies Authority,

considering,

- a. that the licensing regime as laid down in the Information and Communication Technologies (Amendment of Schedule) Regulations 2003 is technologically neutral and service based;
- b. that the Information and Communication Technologies (Amendment of Schedule) Regulations 2003 provides for the Public Land Mobile Network (PLMN) Licence to establish and operate a Public Land Mobile Network (PLMN) and service to the public;
- c. that the PLMN licence defines PLMN as:-

*“a Public Telecommunication Network used for the provision of a Public Land Mobile (PLM) Service:*

- (i) in which the service can be used by a person while moving continuously between places; and*
- (ii) in which the Terminal Equipment used for the service is not in physical contact with any part of the Telecommunication Network through which the service is supplied;”*

- d. that the PLMN licence defines PLMN service as :-

*“a Public telecommunication service provided by means of a PLMN, which includes voice, data, text, video and multi-media”*

- e. that the Information and Communication Technologies (Amendment of Schedule) Regulations 2003 provides for the Internet Services Licence to “*provide Internet services to the public*”. Where “*The service providers may either use the public telecommunication network or set up their own last mile from their point of presence to the subscriber using any appropriate technology after taking the necessary spectrum licence where applicable*”;
- f. that one of its functions under the ICT Act 2001 is to “*promote and maintain effective competition, fair and efficient market conduct between entities engaged in the information and communication industry in Mauritius and to ensure that this Act is implemented with due regard to the public interest and so as to prevent any unfair or anti-competitive practices by licensees*”;
- g. that according to the International Telecommunication Union, Broadband Wireless Access (BWA) may be of the following types:-
  - i. Fixed Wireless Access (FWA);
  - ii. Mobile Wireless Access (MWA), and,
  - iii. Nomadic Wireless Access (NWA) (semi-fixed<sup>1</sup>);
- h. that ITU-T Rec. Q.1702 (02) defines “*Seamless Service*” as a service that “*will prevent users experiencing any service disruptions while maintaining mobility or portability*”;
- i. that ITU-T Rec. Q.1761 defines “*mobility*” as the “*Ability to provide services irrespective of changes that may occur by user/terminal's activities. The user is able to change his network access point, as he moves, without interrupting his current service session, i.e., handovers are possible. In some situations, the handover may lead to a briefly suspended service session or it may require a change in the level of service provided as a consequence of the capabilities of the new access point to which the user has become connected through the handover process*”;
- j. that seamless mobility may be defined as “*The ability for a user or machine to access services, while freely moving within and between network types, regardless of client type, domain or service provider without having to re-authenticate or re-logon while maintaining functionality of any application*<sup>2</sup>”;
- k. that the licensing requirements for a PLMN licensee is different from those of an Internet Service Licensee, especially with regard to the scope of their respective licences and to the respective prescribed licence fees (Rs 8,000,000 per annum for the PLMN licence against Rs 50,000 per annum for the ISP licence);

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<sup>1</sup> ITU-R Rec. M.1457.1

<sup>2</sup> [http://www.itu.int/ITU-D/imt-2000/documents/Nairobi2005/Abstracts/Day%202/NairobiAbstract\\_2\\_1\\_1.pdf](http://www.itu.int/ITU-D/imt-2000/documents/Nairobi2005/Abstracts/Day%202/NairobiAbstract_2_1_1.pdf).

## DECIDES

1. that notwithstanding the fact that ISPs are authorised to set-up their own last mile, they should not be allowed to compete directly or indirectly with PLMN operators in as much as mobility is concerned;
2. that Internet Service Providers (ISP) shall **only** be allowed to offer FWA and NWA (semi-fixed) services;
3. that MWA services shall **only** be offered to the public by duly licensed PLMN operators;
4. that in the provision of NWA services, ISPs shall ensure:-
  - (i) that the systems are **not capable of providing handover**;
  - (ii) that their subscribers are able to access the Internet Services either when stationary or while moving between places **within** a hotspot coverage area at **pedestrian speed**;
  - (iii) that when their subscribers move from one hotspot coverage area to another, their Internet session is **not seamlessly sustained**;
  - (iv) that the service they offer may at **no times** be construed as being a mobile service offering **seamless mobility features** (e.g. handover, operation at vehicular speeds, roaming, etc...);

### **B. Decisions for operation in the 2.400 – 2.4835 GHz Band**

The Information and Communication Technologies Authority,

considering

- a. that the 2.400 – 2.4835 GHz frequency band has been designated for industrial, scientific and medical (ISM) applications by the International Telecommunications Union (ITU) ;
- b. that radiocommunication services operating in this band must accept interference from these ISM applications;

- c. that in Mauritius, the 2.400 – 2.4835 GHz frequency band has been designated for use on a shared, no interference and non-protection basis with no formal frequency assignments;
- d. that the 2.400 – 2.4835 GHz frequency band is used for both point-to-point and point-to-multipoint applications, including IEEE 802.11b/g (Wi-Fi) compliant systems;
- e. that the most popular application in Mauritius for the 2.400 – 2.4835 GHz frequency band is the operation of point-to-point links for Radio Local Area Networks;
- f. that equipment operating in this band complies with the ETSI EN 300 328, whereby the effective isotropic radiated power of such equipment is limited to 20dBm (100mW);
- g. that the noise floor in this frequency band has significantly increased due to the fact that users exceed in most cases the ETSI e.i.r.p. limit;

#### DECIDES

1. that the 2.400 – 2.4835 GHz band shall be reserved for short range (approximately less than 500 m) RLAN applications;
2. that the power limit of devices operating on the 2.400 – 2.4835 GHz band shall be 20 dBm in accordance with ETSI EN 300 328;
3. that all existing systems (PTP and PTMP) shall have a migration period ending on 1<sup>st</sup> of January 2010 to comply with the 20 dBm eirp limit recommended by ETSI;
4. that all existing systems (PTP and PTMP) shall be limited to 23 dBm eirp during the migration period;
5. that all systems put in place following the granting of an application for Extended Private Radio Network Licence (RA19) filed with the Authority prior to the coming into force of this decision shall be allowed to operate at an eirp not exceeding 23 dBm;
6. that all systems that are put in place on the 2.4 GHz band after the coming into force of this decision shall limit their e.i.r.p to 20 dBm;
7. that the standards to which equipment operating in this band shall comply are detailed at Annex 1.

### C. Decisions for operation in the 2.500 – 2.690 GHz Band

The Information and Communication Technologies Authority,

considering,

- a. that the 2.500 – 2.690 GHz frequency band is currently used for multichannel multipoint distribution service (MMDS);
- b. that the current MMDS plan used in Mauritius is based on a channel separation of 8MHz wide;
- c. that MMDS systems are currently in operation in this band;
- d. that Article 5.384A of the ITU Radio Regulations states that the 2.500 – 2.690 GHz frequency band or portions of this band have been identified for use by administrations wishing to implement International Mobile Telecommunications-2000 (IMT-2000) in accordance with Resolution 223 (WRC-2000);
- e. that Resolution 225 of the World Radio Conference 2003 (WRC-03) resolves “*that the band 2 500 – 2 520 MHz and 2 670 – 2690 MHz as identified for IMT-2000 in No. 5.384A and allocated to the mobile-satellite service may be used by administrations wishing to implement the satellite component of IMT-2000; however, depending on market developments, it may be possible in the longer term for bands 2 500 – 2 520 MHz and 2 670 – 2690 MHz to be used by the terrestrial component of IMT-2000*”;
- f. that the Electronic Communications Committee (ECC) adopted, on 18 March 2005, Decision (02)06 on the “*harmonised utilisation of spectrum for IMT-2000/UMTS systems operating within the band 2.500-2.690 GHz*” to make available for use the said band by IMT-2000/UMTS systems by 01 January 2008, subject to market demand and national licensing schemes;
- g. that this band is being considered for the operation of equipment which complies with IEEE 802.16 (WIMAX ) standard;

#### DECIDES

1. that the 2.500 – 2.690 GHz frequency band shall be made fully available for IMT-2000 and Broadband Wireless Access (BWA) Services by 1<sup>st</sup> January 2010 or earlier as may be required;
2. that the 2.500 – 2.520 GHz and 2.670 – 2.690 GHz frequency bands shall be designated for the satellite component of IMT-2000 in accordance with Res. 225 of



WRC-03. The said bands may also be used for the terrestrial component of IMT-2000 depending on market developments.

3. that the 2.500 – 2.520 GHz and 2.670 – 2.690 GHz frequency bands shall be opened as from 1<sup>st</sup> January 2010 or earlier as may be required;
4. that services in the 2.520 – 2.670 GHz shall include IMT-2000 and other compatible technologies which can provide BWA;
5. that the said band shall be restricted for provision of mobile and nomadic services only and allocated to those operators holding appropriate commercial licences;
6. that in assigning frequency channels in this band, the Authority will give priority to licensed operators offering a service to the public;
7. that portions of the band which are presently free shall be allocated upon successful determination of an application for the appropriate Network Spectrum Licence;
8. that the channelisation plan at Annex 2 shall be applicable;
9. that assignments made in this band for any existing BWA system shall fully comply with channelisation plan at Annex 2 at latest by 1<sup>st</sup> January 2010;
10. that the Standards to which equipment operating in this band has to comply are detailed at Annex 1.
11. that where:-
  - i. the 2.500 – 2.690 GHz is harmonized for deployment of IMT-2000 systems in accordance with WRC-00 and WRC-03 resolutions in major parts of the world, and,
  - ii. there is a national demand for additional spectrum for deployment of IMT-2000,

the Authority may review this decision with a view to facilitating roaming and give sufficient time to BWA systems not part of the IMT-2000 family to migrate to some other frequency bands as may be determined.

#### **D. Decisions for operation in the 3.5 GHz Band**

The Information and Communication Technologies Authority,

considering,

- a. that the frequency band 3.400 – 3.600 GHz has been allocated to the fixed service and fixed satellite (space-to-earth) service on a primary basis, and to radiolocation and mobile services on a secondary basis in Mauritius;
- b. that the frequency band 3.600 – 3.700 GHz has been allocated to fixed service and fixed satellite (space-to-earth) service on a primary basis, and to mobile service on a secondary basis;
- c. that Very Small Aperture Terminals (VSATs) operate in the 3.600 – 4.200 GHz frequency band for Space to Earth communication;
- d. that this band may be of major importance in the near future as it is being considered for the operation of equipment which complies with IEEE 802.16 (WIMAX ) standard;
- e. that ITU-R Recommendation SF.1486 considers that there is a need to protect co-primary services within the 3.400 – 3.700 GHz frequency band from interference from each other;
- f. that co-frequency sharing between VSAT and Point-to-multipoint BFWA systems may be difficult for VSATs operating at low elevation angles;

DECIDES

1. that the 3.400 – 3.600 GHz frequency band shall be opened for Broadband Fixed Wireless Access Systems;
2. that point to multipoint applications will be favoured, requests from operators wishing to implement point to point links will however be considered;
3. that the channelisation plan as at Annex 3 shall be applicable. This plan which is in compliance with ITU-R Rec. F.1488 consists of allocation blocks formed from the aggregation of 0.25 MHz frequency slots;
4. that Network Spectrum Licensing shall be applicable;
5. that in assigning frequency channels in this band, the Authority will give priority to public operators.
6. that a power limit of 15 W eirp shall be imposed for operations in this band;

7. that the standards to which equipment operating in this band has to comply are detailed at Annex 1.

#### **E. Decisions for operation in the 5.150 – 5.350 band**

The Information and Communication Technologies Authority,

considering,

- a. that the frequency bands 5.150-5.350 GHz has been allocated to the mobile service except aeronautical mobile service on a primary basis for the implementation of Wireless Access Systems (WAS) including Radio Local Area Networks (RLANs) by WRC-03 (Resolution 229 WRC-03);
- b. that Wireless Access Systems may be deployed either inside or outside buildings, usually in geographically limited areas;
- c. that the implementation of transmitter power control (TPC) in WAS/RLANs in the bands 5.250-5.350 GHz significantly reduces the aggregate interference in these bands;

#### **DECIDES**

1. that the 5.150 – 5.350 frequency band shall be made available for broadband mobile Wireless Access Systems on a shared, no interference and non-protection basis;
2. that the 5.150-5.350 MHz frequency band shall be opened for indoor use only;
3. that no fixed point-to-point applications shall be allowed in this frequency band;
4. that the mean e.i.r.p. for the 5.150 - 5.250 GHz frequency band shall be limited to 200 mW (23 dBm) and maximum mean eirp density of 10mW/MHz in any 1 MHz or equivalent or equivalently 0.25mW/25 kHz in any 25 kHz band;
5. that the mean e.i.r.p. for the 5.250-5.350 GHz frequency band shall be limited to 200mW maximum mean eirp density of 10mW/MHz in any 1 MHz ;
6. that the use of dynamic frequency selection (DFS) as well as transmitter power control (TPC) shall be required above 5.250 GHz;
7. that an apparatus licensing regime shall be applicable;

5. that the standards to which equipment operating in this band shall comply are detailed at Annex 1.

#### **F. Decisions for operation in the 40.5 – 43.5 GHz Band**

The Information and Communication Technologies Authority,

considering,

- a. that the 40.5-42.5 GHz frequency band has been allocated by the ITU, in Region 1, on a co-primary basis to the broadcasting, broadcasting-satellite and fixed services;
- b. that the 42.5-43.5 GHz frequency band has been allocated by the ITU, in Region 1, on a co-primary basis to the Fixed, Fixed-Satellite, Mobile (excluding aeronautical mobile) and Radio Astronomy services;
- c. that the 40.5 - 43.5 GHz frequency band has been designated for Multimedia Wireless Systems including Multipoint Video Distribution Systems (MVDS) in Europe within the European Conference of Postal and Telecommunications (CEPT) Administrations;
- d. that the 40.5 – 43.5 GHz frequency band may not be appropriate for establishing wide coverage systems in Mauritius because of the local climatic and topographic conditions;

DECIDES

1. that the 40.5 – 43.5 GHz frequency band shall be opened for the purpose of Multimedia Wireless Systems including Multipoint Video Distribution Systems (MVDS) if there is a demand for this band;
2. that the standards to which equipment operating in this band shall comply are detailed at Annex 1.

## ANNEX 1

Frequency Band	Applicable Standards		
	RF Spectrum	Electromagnetic Compatibility	Safety
2.400 – 2.4835 GHz	ETSI EN 300 328	EN 301 489-1 EN 301 489-17	ISO/IEC 60950 EN 60950
2.500 – 2.690 GHz <sup>3</sup>	ETSI EN 301 373 (FDMA) ETSI EN 301 055 (DS-CDMA) ETSI EN 300 636 (TDMA) ETSI EN 301 179 (FH-CDMA)	EN 301 489-1 EN 301 489-4	ISO/IEC 60950 EN 60950
3.400 – 3.600 GHz <sup>4</sup>	ETSI EN 301 021 (TDMA) ETSI EN 301 080 (FDMA) ETSI EN 301 124 (DS-CDMA) ETSI EN 301 253 (FH-CDMA) ETSI EN 301 753 (Generic harmonized standard)	EN 301 489-1 EN 301 489-4	ISO/IEC 60950 EN 60950
5.150 – 5.350 GHz	ETSI EN 300 893	EN 301 489-1 EN 301 489-17	ISO/IEC 60950 EN 60950
40.5 – 43.5 GHz	ETSI EN 301 997-1 ETSI EN 301 997-2 ETSI EN 301 215-3 (Antenna)	EN 301 489-1	ISO/IEC 60950 EN 60950

<sup>3</sup> Standards apply to point-to-multipoint equipment in frequency bands 1 – 3 GHz

<sup>4</sup> Standards apply to point-to-multipoint equipment in frequency bands 3 – 11 GHz

## ANNEX 2

### CHANNELLING ARRANGEMENTS BLOCKS IN THE BAND 2500 – 2690 MHz

2500 MHz	2505 MHz	2510 MHz	2515 MHz	2520 MHz	2525 MHz	2530 MHz	2535 MHz	2540 MHz	2545 MHz	2550 MHz	2555 MHz	2560 MHz	2565 MHz	2570 MHz	2575 MHz	2580 MHz	2585 MHz	2590 MHz	2595 MHz	2600 MHz	2605 MHz	2610 MHz	2615 MHz	2620 MHz	2625 MHz	2630 MHz	2635 MHz	2640 MHz	2645 MHz	2650 MHz	2655 MHz	2660 MHz	2665 MHz	2670 MHz	2675 MHz	2680 MHz	2685 MHz	2690 MHz
UL 01	UL 02	UL 03	UL 04	UL 05	UL 06	UL 07	UL 08	UL 09	UL 10	UL 11	UL 12	UL 13	UL 14	TDD										DL 01	DL 02	DL 03	DL 04	DL 05	DL 06	DL 07	DL 08	DL 09	DL 10	DL 11	DL 12	DL 13	DL 14	
FDD Uplink Blocks														TDD										FDD Downlink Blocks														

- IMT-2000 Satellite or terrestrial component
- Wireless Access Systems FDD
- Wireless Access Systems TDD

ANNEX 3

**CHANNELISATION PLAN FOR THE 3.400 – 3.600 GHz FREQUENCY PLAN**

<i>Lower Blocks (MHz)</i>	<i><math>0.25 N + 3400</math> to <math>0.25 (N + k) + 3400</math></i>
<i>Upper Blocks (MHz)</i>	<i><math>0.25 (N + 400) + 3400</math> to <math>0.25 (N + k + 400) + 3400</math></i>
<i><math>1 \leq k \leq 400, 0 \leq N \leq 399, k + N \leq 400</math></i>	