



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

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**Response to Public Consultation Paper and Conclusions of the
ICT Authority – Spectrum Allocation for Broadband Fixed
Wireless Access Services in Mauritius (*Ref. 2005/2*)**

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Forward

The ICT Authority recognizing the high demand for spectrum to implement Broadband Fixed Wireless Access (BFWA) systems, has published on 14 February 2005, a public consultation document on “*Spectrum Allocation for Broadband Fixed Wireless Access Services in Mauritius*”. The Authority, taking into consideration the recent developments on the international scene, particularly the resolutions of the ITU World Radio Conference 2003 (WRC-03) and the standardisation work carried out by the Institution of Electrical and Electronic Engineers (IEEE) and the WiMAX Forum, also recognised the need for a clear policy with regard to the allocation and use of spectrum for BFWA in Mauritius.

The Authority has considered the following potential bands in its consultation document for the deployment of BFWA:-

- a. 450 MHz;
- b. 2.400 – 2.4835 GHz;
- c. 2.500 – 2.690GHz;
- d. 3.400 – 3.800 GHz;
- e. 5.150 – 5.250 GHz;
- f. 5.250 – 5.350 GHz;
- g. 5.474 – 5.725 GHz;
- h. 5.725 – 5.850 GHz
- i. 23 - 32 GHz;
- j. 40.5 – 43.5 GHz.

The consultation exercise ended on the 14 March 2005 and by that date, the Authority had received contributions from thirteen companies and organisations in Mauritius and abroad. The Authority has analysed all contributions and presents in this document a summary of responses received together with its views and conclusions.

The Authority also met with the stakeholders in an open house session held on 20 April 2005 with a view to presenting its conclusions before issuing its final decisions.

Dr. M. K. Oolun

Executive Director, ICT Authority

1.0 Introduction

The International Telecommunication Union (ITU) defines wireless access as “*End-user radio connection(s) to core networks, where core networks include, for example, PSTN, ISDN, PLMN, PSDN, Internet, WAN/LAN, CATV*” and fixed wireless access 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*”.

There are different definitions for BFWA, the definition adopted for BFWA is a fixed wireless access technology that provides speeds in excess of 256 kbps, and which provides services over a coverage range of a few hundred metres to over several kilometers.

In the course of this consultation exercise, the Authority has identified technologies which are able to offer other types of wireless access, namely, Mobile Wireless Access (MWA) and Nomadic Wireless Access (NWA). The ITU defines the two terms as follows:-

“Mobile Wireless Access (MWA) is wireless access application in which the location of the end-user termination is mobile”

“Nomadic Wireless Access is 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”

It is worth noting at this stage that a mobile service is a radiocommunication service which requires a specialised network enabling among other things handover. This is the action of switching a call in progress from one cell to another (intercell) or between radio channels in the same cell (intracell) without interruption of the call¹. A mobile network may not be set up unless a person holds a valid Public Land Mobile Network (PLMN) licence issued by the Authority.

One of the main motives of the Authority in conducting the consultation exercise and in proposing to open frequency bands for the purpose of BFWA is to enable Internet Service Providers (ISPs) to set up their own last mile as specified under the *Information and Communication Technologies (Amendment of Schedule) Regulations 2003*. It is to be noted that under the Internet Services licence, ISPs will be allowed to set up Broadband Fixed Wireless Access and Broadband Nomadic Wireless Access systems only.

In this document, the Authority presents a resume of the contributions to the questions posed in the consultation document and gives its views and conclusions based on the said contributions.

¹ Recommendation ITU-R M.1224

2.0 The 450 MHz band

Q2.1.1 Please indicate your opinion with regards to the opening of the 450 MHz band to BFWA.

77% of the respondents reacted to this question. Most parties believed that the band should be reserved for 3G mobile service or for Private Mobile Radio (PMR) rather than for BFWA.

Q2.1.2 Please indicate the type of project you may have in the band 450 MHz.

No BFWA projects were indicated in the responses (only PMR and CDMA mobile networks)

Q2.1.3 Please indicate proposed network topology (point-to-multipoint, mesh, etc...)

Most responses indicated Point to multipoint network topology

Q2.1.4 Do you envisage having an island wide deployment? Else specify the intended regions your project may cover.

Island-wide deployment was the most common response

Q2.1.5 What is the time frame for implementation of your project?

Respondents had no plans to implement BFWA projects in the near future.

Conclusions of the Authority

- ***Based on the above, the Authority is of the opinion that the 450 MHz band has to be reserved for mobile applications specially PMR and also for fixed point to point links as is currently the case.***
- ***This band will therefore not be opened for BFWA services.***

3.0 The 2.400 – 2.4835 GHz ISM band

Q2.2.1 Do you agree that it is becoming more and more difficult to use the 2.400 – 2.4835 GHz band for RLAN because of spectrum pollution?

Most respondents agree that there is a problem of spectrum pollution in the 2.400 – 2.4835 GHz band.

Q2.2.2 Do you agree that to share the 2.400 – 2.4835 GHz band as a public park the eirp and range/hop-length have to be limited? Please substantiate your answer.

All the respondents who have responded to this question are of the opinion that the eirp should be limited. They however do not agree that the range should be limited.

Q2.2.3 Do you agree with the proposal of the Authority with regard to the eirp and range/hop-length limits? Please substantiate your answer.

Only two of the respondents agree with the limits proposed in the consultation document. While one of the respondents is of the opinion that the eirp should be limited to 100mW, four of the respondents do not agree with the limits proposed in the document.

Conclusions of the Authority

- ***The eirp are to be limited to 23 dBm for all existing systems.***
- ***Operators in this band are to have 5 years (until 1st of January 2010) in order to comply with the 20 dBm eirp limit recommended by ETSI. The Authority is taking this decision as it is confident that the new bands being opened for BFWA are more appropriate for higher eirp applications.***
- ***New systems on the 2.4 GHz band are to limit their eirp to 20 dBm.***
- ***The range is not to be limited.***
- ***The Standards to which equipment operating in this band has to comply are detailed at Annex 1.***

4.0 The 2.500 – 2.690 GHz band

Q2.3.1 Do you think that there is a need to reserve the 2500 – 2690 MHz for MMDS?

Out of 7 responses received, 2 companies requested that the band be reserved for MMDS, while 1 party was of the opinion that the band should not be reserved only for MMDS.

Q2.3.2 Which option do you consider most appropriate for the current applications of the MMDS band?

Two respondents were in favour of Option 1 and another two preferred Option 2.

Q2.3.2b With regard to option 2, please indicate whether, in your opinion, spectrum has to be earmarked for FDD applications

No specific response was received for this question; one party suggested that it be left to operators to decide based on economic factors.

Q2.3.3 Please indicate the type of project you may have in the band 2500 – 2690 MHz.

Projects for deployment of the following systems were mentioned:-

- MMDS
- IMT-2000 deployment
- WiMax broadband wireless access

Q2.3.4 Do you think that the bands 2500 – 2690 MHz has to be reserved for IMT-2000?

To this question,

- 6 companies chose not to respond
- 5 companies agreed that the 2500 – 2690 MHz band should be reserved for IMT-2000
- 1 respondent believed that the band should not be made available exclusively to IMT-2000
- 1 respondent preferred that the band be reserved for MMDS

Conclusions of the Authority

- *The band is to be made fully available for IMT-2000 and Broadband Wireless Access (BWA) Services by 2010.*
- *Network Spectrum Licensing is to be applicable.*
- *The 2500 – 2520 MHz and 2670 – 2690 MHz are to 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. The bands are to be opened as from 2010.*
- *Services in the 2520 – 2670 MHz are to include IMT-2000 and other compatible technologies which can provide BWA.*
- *Portions of the band which are presently free may be allocated upon successful determination of an application for the appropriate Network Spectrum Licence.*
- *Note that the said band is to be restricted for provision of mobile services and nomadic services only and allocated to those operators holding appropriate commercial licences.*
- *The channelisation plan proposed for adoption is at Annex 2.*
- *The Standards to which equipment operating in this band has to comply are detailed at Annex 1.*

5.0 The 3.400 – 3.800 GHz band

Q2.4.1 Please indicate your opinion with regard to the opening of the 3.4 – 3.6 GHz band to BWFA and also with regard to the technical and regulatory proposals of the Authority.

- 7 respondents concurred that the band should be regulated and opened for BFWA.
- Option 2 was favoured by most

Q2.4.2 Please indicate the type of project you may have in the band 3.4 – 3.6 GHz.

The main types of projects indicated were:-

- Wireless Access Systems; and,
- 6 out of 8 respondents wish to deploy their network based on a WiMax platform

Q2.4.3 Please indicate proposed network topology (point to multipoint, mesh etc...).

Both point to point and point to multipoint deployments are forecasted

Q2.4.4 Do you envisage having an island-wide deployment? Else specify the intended regions your project may cover.

Respondents were unanimous in replying that the deployment would be island-wide

Q2.4.5 What is the time frame for implementation of your project?

Here, opinions varied but projects would start as from mid 2005 if possible and implementation would take up to a maximum of 2 years.

Conclusions of the Authority

- *Given the high demand, this band is to be opened for BFWA.*
- *Network Spectrum Licensing is to be applicable.*
- *Option 2 presented in the consultation paper has been retained for the channelisation plan. The 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. The edge frequencies of each sub-band are as defined below.*

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

Table 1:- Frequency duplex allocation with a duplex spacing of 100 MHz for the 3 400-3 600 MHz band

- *Point to multipoint links is to be favoured.*
- *Operators wishing to implement point to point links will have to substantiate their requests.*
- *A power limit of 15 W eirp is proposed for operations in this band. This limit may however be altered depending on the outcome of any further studies which the Authority may undertake.*
- *The Standards to which equipment operating in this band has to comply are detailed at Annex 1.*

6.0 The 5.150 –5.250, 5.250 – 5.350 GHz and 5.470 –5.725 GHz bands

Q2.5.1 Please indicate your opinion with regard to the opening of the 5.150 –5.350 GHz and 5.470 – 5.725 GHz bands for Wireless Access Systems.

Seven respondents have responded to this question and all are of the opinion that these bands should be opened on an unlicensed basis. Furthermore three of the respondents have suggested that the 5.150 –5.350 GHz band be reserved for future use.

Q2.5.2 Please indicate the type of project you may have in the 5.150 – 5.350 GHz and 5.470 – 5.725 GHz bands.

Those who have responded to this question have projects for both point-to-point and point-to-multipoint applications in this band.

Q2.5.3 Do you think that the 5.150 – 5.350 GHz and 5.470 – 5.725 GHz bands should be exempted from licence conditions?

All respondents who have responded to this question agree that these bands should be licence exempt.

Conclusions of the Authority

- ***There is a demand for the opening of this band.***
- ***As proposed by the ICT Authority the bands are to be opened on an unlicensed basis subject to the proper legislation being put in place.***
- ***5 150-5 350 MHz
Only indoor use, mean e.i.r.p.² limited to 200 mW (23 dBm), and use of dynamic frequency selection (DFS) as well as transmitter power control (TPC) are required above 5 250 MHz;***
- ***5 470-5 725 MHz
Indoor as well as outdoor use allowed, mean e.i.r.p.² limited to 1 W (30 dBm), use of dynamic frequency selection (DFS) and transmitter power control (TPC) required.***
- ***The Authority is currently finalizing the conditions enabling the sharing of 5 470 – 5725 MHz between Radiolocation and BWA***
- ***The Standards to which equipment operating in this band has to comply are detailed at Annex 1.***

² The "mean e.i.r.p." refers to the e.i.r.p. during the transmission burst which corresponds to the highest power, if power control is implemented.

7.0 The 5.725 – 5.850 GHz band

Q2.6.1 Please indicate your opinion with regard to the opening of the 5.725 –5.850 GHz band for Wireless Access Systems.

Out of 8 responses received with respect to this question, one respondent is totally against the opening of this band and one respondent is of the opinion that the opening of this band would cause interference to earth-to-space satellite services. The others are favorable to the opening of this band. One of the respondents suggested that the eirp for point-to-multipoint operations be limited to 4W (TPC used) and that the eirp be unlimited or at least limited to 200W for point-to-point operations.

Q2.6.2 Please indicate the type of project you may have in the 5.725 – 5.850 GHz band.

Most respondents have not responded to this question. Those who have responded are considering WiMax and wireless Internet access applications.

Q2.6.3 Please indicate proposed network topology (point-to-multipoint, mesh, etc...)

The respondents who have responded to this question are envisaging both point-to-point and point-to-multipoint topologies.

Q2.6.4 Do you think that an apparatus licensing regime is appropriate for apparatus 5.725 – 5.850 GHz band?

Those respondents who have responded to this question are favorable to the band being licensed.

Conclusions of the Authority

- ***Systems operating in this band are to employ both Dynamic frequency selection (DFS) and Total Power Control (TPC).***
- ***Given the size of Mauritius and the operation of Radiolocation and satellite services in this band and adjacent bands, the preferred maximum eirp is 2W and Power Spectral density of 100mW/MHz for both point-to-point and point-to-multipoint operation. These limits may however be altered depending on the outcome of any further studies which the Authority may undertake.***
- ***The preferred channelizations are 5 MHz, 10 MHz and 20 MHz.***
- ***Since there are currently no ETSI standards for BFWA equipment operating in this band, UK Radio Interface Requirement 2007 published by Ofcom may be used as a guideline for the type approval of equipment operating in this band.***

- ***The Authority is currently considering the possibility of operating at eirp higher than 2W and PSD higher than 100mW/MHz. The Authority is also finalizing the conditions enabling the sharing of 5 470 – 5725 MHz between Radiolocation and BWA***

8.0 The 23 – 32 GHz band

Q2.7.1 Please indicate your opinion with regard to the opening of the 24.5 – 26.5 GHz and 27.5 – 29.5 GHz bands for Wireless Access Systems.

Operators have varied opinions:-

- Band is suitable for LMDS
- Band is not suitable for BFWA in Mauritius because of climatic and topological constraints
- May consider implementation of backhaul systems in this band

Q2.7.2 Please indicate the type of project you may have in 24.5 – 26.5 GHz and 27.5 – 29.5 GHz bands.

Few responses were received. Most companies do not have immediate projects in this band.

Q2.7.3 Please indicate proposed network topology (point to multipoint, mesh etc...).

Point to multipoint topology was proposed by 3 respondents

Conclusions of the Authority

- ***The Authority is of the view that there is no significant demand which would mandate the opening up of this band for BFWA for the moment***
- ***The propagation characteristics associated with signals in this band may not be appropriate for the local climatic and topographic conditions.***
- ***The Authority may review its decision as and when there exists significant demand to open this band for BFWA.***
- ***The Standards to which equipment operating in this band has to comply are detailed at Annex 1.***

9.0 The 40.5 – 43.5 GHz band

Q2.8.1 Please indicate your opinion with regard to the opening of the 40.5 – 43.5 GHz band for Multimedia Wireless Systems (MWS).

Less than half of the respondents are favourable to the opening of this band. One of the respondents is of the opinion that this band may not be appropriate because of the poor propagation characteristics of the signals in this frequency band.

Q2.8.2 Do you consider that there is a demand for MWS in Mauritius?

Only one local company considers that there is a demand for MWS.

Q2.8.3 Please indicate the type of project you may have in the 40.5 – 43.5 GHz band.

Only one local respondent has a project for the provision of video on demand services.

Q2.8.4 Please indicate proposed network topology (point-to-multipoint, mesh, etc...)

No responses received for this question

Conclusions of the Authority

- ***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.***
- ***The Authority would open the 40.5 – 43.5 GHz band for the purpose of MVDS applications if there is a demand it.***
- ***The Standards to which equipment operating in this band has to comply are detailed at Annex 1.***

Annex 1

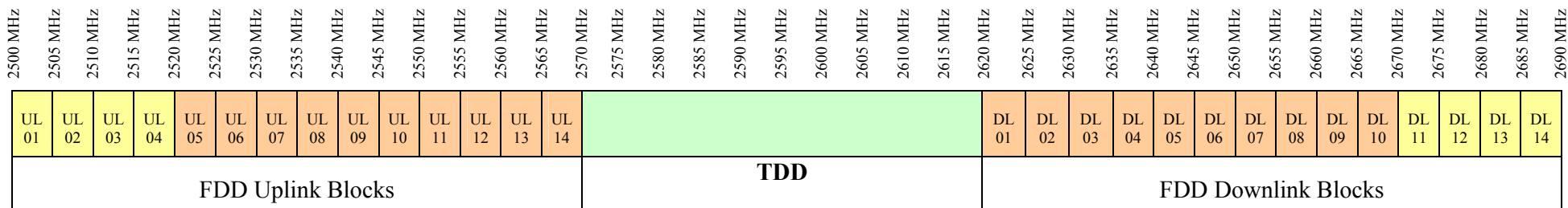
Frequency Band	Applicable Standards		
	RF Spectrum	Electromagnetic Compatibility	Safety
2.400 – 2.4835 GHz	ETSI EN 300 328	EN 301 489-1 EN 301 489-17	ISO/IEC 60950 EN 60950
2.500 – 2.690 GHz ³	ETSI EN 301 373 (FDMA) ETSI EN 301 055 (DS-CDMA) ETSI EN 300 636 (TDMA) ETSI EN 301 179 (FH-CDMA)	EN 301 489-1 EN 301 489-4	ISO/IEC 60950 EN 60950
3.400 – 3.600 GHz ⁴	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 5.470 – 5.725 GHz	ETSI EN 300 893	EN 301 489-1 EN 301 489-17	ISO/IEC 60950 EN 60950
24.5 – 26.5 GHz 27.5 – 29.5 GHz	ETSI EN 301 213-1 (Basic Parameters) ETSI EN 301 213-2 (FDMA) ETSI EN 301 213-3 (TDMA) ETSI EN 301 213-4 (DS-CDMA) ETSI EN 301 213-2 (MC-TDMA)	EN 301 489-1	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

³ Standards apply to point-to-multipoint equipment in frequency bands 1 – 3 GHz

⁴ Standards apply to point-to-multipoint equipment in frequency bands 3 – 11 GHz

ANNEX 2

CHANNELLING ARRANGEMENTS BLOCKS IN THE BAND 2500 – 2690 MHz



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