

# Spectrum Allocation for Broadband Fixed Wireless Access Services in Mauritius



Jerome Louis  
ICT Authority



Tuesday, May 10, 2005

## This Session

- Background
- Wireless Access Systems – Brief Review
- Broadband Wireless Access – Potential Frequencies
- Summary of Proposals
- Consultation Results and Authority's views
- Conclusion



Tuesday, May 10, 2005



## Background



- The Authority published a public consultation document entitled “*Spectrum Allocation for Broadband Fixed Wireless Access Services in Mauritius*” on 14 February 2005
- The consultation paper proposed a list of frequency bands, technical characteristics and regulatory requirements to be adopted for deployment of BFWA
- The consultation exercise ended on 14 March 2005
- The Authority received 13 contributions from stakeholders in Mauritius and abroad

Tuesday, May 10, 2005



## The Mandate of the ICT Authority



- “*allocate frequencies and manage, review, and, where appropriate, reorganise the frequency spectrum*” (Section 18(1)(p) ICT Act 2001)
- “*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*” (Section 16(g) ICT Act 2001)

Tuesday, May 10, 2005



## Developments in Wireless Access Technologies



- Traditional Wireless Access – ETACS, AMPS, GSM, CDMA IS-95, MMDS, LMDS, etc...
- Modern Wireless Access – UMTS, CDMA2000, TD-SCDMA, MC-CDMA, OFDM, Wi-Fi, Wi-Max, etc...

Tuesday, May 10, 2005



## Considerations of the ICT Authority



- In this exercise, the Authority constantly takes into consideration:-
  - The statute
  - The Radio Regulations which is binding on all ITU member states (Article 4, Constitution of the ITU)
  - The resolutions of World Radio Conferences (WRCs)
  - The local context
  - ITU Recommendations
  - The International trends, i.e. position of the European Commission, other regulatory bodies, industry organizations among others.

Tuesday, May 10, 2005



## Wireless Access Systems – Brief Review



- 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”***

Tuesday, May 10, 2005



## Wireless Access Systems – Brief Review (cont'd)

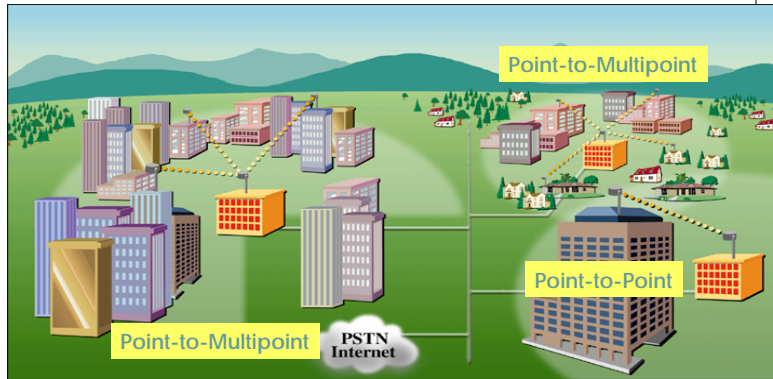


- **Fixed wireless access** – *“Wireless access application in which the location of the end-user termination and the network access point to be connected to the end-user are fixed”.*
- **Mobile Wireless Access** – *“Wireless access application in which the location of the end-user termination is mobile”*
- **Nomadic Wireless Access** – *“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”*

Tuesday, May 10, 2005



# What is Broadband Fixed Wireless Access (BFWA)?



Broadband – Channel capacity in excess of 256 kbps

Tuesday, May 10, 2005



# Mobile Wireless Access



- A mobile service is a radiocommunication service which requires a specialised network enabling among other things handover.
- Handover 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 call (Recommendation ITU-R M.1224)
- A mobile network may not be set up unless a person holds a valid Public Land Mobile Network (PLMN) licence issued by the Authority.

Tuesday, May 10, 2005



## Frequency Bands proposed for BWA



- 450 MHz;
- 2.400 – 2.4835 GHz;
- 2.500 – 2.690GHz;
- 3.400 – 3.800 GHz;
- 5.150 – 5.250 GHz;
- 5.250 – 5.350 GHz;
- 5.474 – 5.725 GHz;
- 5.725 – 5.850 GHz
- 23 - 32 GHz;
- 40.5 – 43.5 GHz.

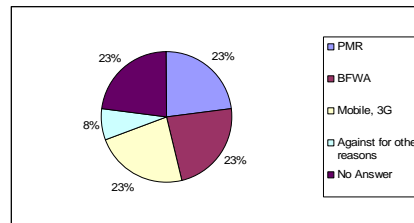
Tuesday, May 10, 2005



## The 450 MHz Band



- Pie Chart shows response to question:-  
***“Please indicate your opinion with regards to the opening of the 450 MHz band to BWFA”***
- *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.*



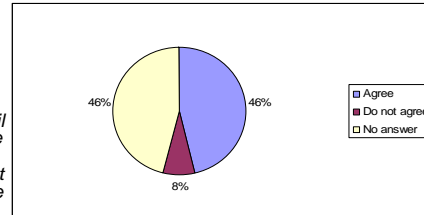
Tuesday, May 10, 2005



## The 2.4 GHz ISM Band



- Pie Chart shows response to question:-  
**“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?”**
- The Authority therefore concludes that:-
  - The eirp shall be limited to 23 dBm for all existing systems;
  - Operators in this band would 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 shall limit their eirp to 20 dBm;
  - The range shall not be limited.



Tuesday, May 10, 2005



## The 2.6 GHz Band



- Band plan with channel separation of 8 MHz is currently in use in Mauritius for the purpose of running Multichannel Multipoint Distribution Systems (MMDS)
- No. 5.384A of the ITU Radio Regulations states that **“The bands, or portions of the bands, 1 710-1 885 MHz and 2 500-2 690 MHz, are identified for use by administrations wishing to implement *International Mobile Telecommunications-2000 (IMT-2000)* in accordance with Resolution 223 (WRC-2000)...”**

Tuesday, May 10, 2005



## The 2.6 GHz Band (cont'd)



- 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”*
- On 18 March 2005, the Electronic Communications Committee (ECC) adopted 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.

Tuesday, May 10, 2005



## The 2.6 GHz Band (cont'd)



- The WIMAX Forum has identified the 2.5 – 2.7 GHz band as one of the bands which according to it is most likely to be harmonized internationally for operation of IEEE 802.16 technology
- The Forum plans to influence the ITU so as to allow the IEEE 802.16 technology to be part of the IMT-2000 family which, as at date, consists of WCDMA, CDMA-2000, TD-SCDMA, DECT and EDGE

Tuesday, May 10, 2005



## The 2.6 GHz Band (cont'd)



- **Conclusions of the Authority:-**


- *The band shall be made fully available for Broadband Wireless Access (BWA) Services by 2010.*
- *Network Spectrum Licensing shall be applicable.*
- *The 2500 – 2520 MHz and 2670 – 2690 MHz are 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 shall be opened as from 2010.*
- *Services in the 2520 – 2670 MHz will 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.*
- *The band will be restricted for provision of mobile services and nomadic services only and allocated to those operators holding appropriate commercial licences.*

Tuesday, May 10, 2005




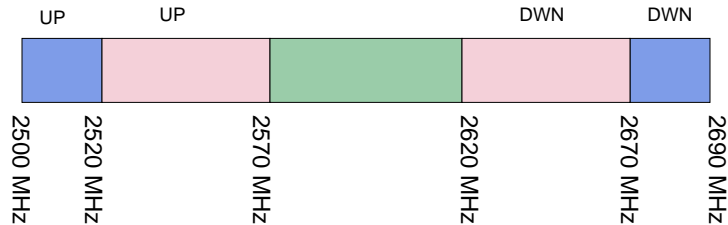
## The 2.6 GHz band (cont'd)



 IMT-2000 Satellite or Terrestrial Component

 Wireless Access System FDD

 Wireless Access System TDD



Channelisation of 5 MHz

Tuesday, May 10, 2005



## The 3.5 GHz (3400 – 3600 MHz) Band



- To the question:- *“Please indicate your opinion with regard to the opening of the 3.4 – 3.6 GHz band to BFWA and also with regard to the technical and regulatory proposals of the Authority”, 54% of respondents agreed that the 3.5 GHz band has to be opened for BFWA.*

Tuesday, May 10, 2005



## The 3.5 GHz (3400 – 3600 MHz) Band (cont'd)



- **Conclusions of the Authority:-**
  - *Given the high demand, this band will be opened for BFWA.*
  - *Network Spectrum Licensing shall 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.*
  - *Point to multipoint links will be favoured.*
  - *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.*

Tuesday, May 10, 2005



## The 5.150 – 5.350 GHz and 5.470 – 5.725 GHz Bands



- To the question:- *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, 54 % of the respondents agreed that the band should be opened on a licensed exempt basis.*

Tuesday, May 10, 2005



## The 5.150 – 5.350 GHz and 5.470 – 5.725 GHz Bands (cont'd)



- **Conclusions of the Authority:-**
  - *There is a demand for the opening of this band.*
  - *As proposed by the ICT Authority the bands would be opened on a licence exempt basis subject to the proper legislation being put in place.*
  - *For the moment an apparatus licensing regime will be applied*
  - 5 150-5 350 MHz  
*Indoor use only, mean e.i.r.p. 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. limited to 1 W (30 dBm), use of dynamic frequency selection (DFS) and transmitter power control (TPC) required.*

Tuesday, May 10, 2005



## The 5.725 – 5.850 GHz band



- The 5.725 – 5.850 GHz frequency band has been allocated in Region 1 to FIXED-SATELLITE (Earth-to-space) among other services
- Several Satellites having footprints on Mauritius are either within the whole of the band or in the band close to 5.850 GHz

Tuesday, May 10, 2005



## The 5.725 – 5.850 GHz band (cont'd)



- The Draft ECC Report 68 on *“Compatibility Studies in the Band 5725 – 5875MHz between Fixed Wireless Access Systems and other Systems”* concludes that *“Sharing is dependent on the ability of FWA system to limit the e.i.r.p. density in the direction of the satellite”*
- No ETSI standards for BFWA equipment operating in this band
- UK Radio Interface Requirement 2007 published by Ofcom specifies a maximum eirp of 2W and PSD of 100mW/MHz

Tuesday, May 10, 2005



## The 5.725 – 5.850 GHz band (cont'd)



- **Conclusions of the Authority:-**
  - Systems operating in this band should employ both Dynamic frequency selection (DFS) and Total Power Control (TPC).
  - Given the size of Mauritius and the operation of satellite services in this band and adjacent bands, the eirp shall be limited to 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 channelization shall be of 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 would be used as a guideline for the type approval of equipment operating in this band.

Tuesday, May 10, 2005



## The 24.5 – 26.5 GHz and 27.5 – 29.5 GHz Bands



- To the question:- *“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”*, contributors were of 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

Tuesday, May 10, 2005



## The 24.5 – 26.5 GHz and 27.5 – 29.5 GHz Bands



- **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.*

Tuesday, May 10, 2005



## The 40.5 – 43.5 GHz Band



- To the question:- *“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 were favourable to the opening of this band. One of the respondent was of the opinion that this band may not be appropriate for Mauritius because of the poor propagation characteristics of the signals in this frequency band.*

Tuesday, May 10, 2005



## The 40.5 – 43.5 GHz Band (cont'd)



- **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.*

Tuesday, May 10, 2005



## Conclusion



- In this presentation: -
  - The Rationale behind the Consultation exercise has been explained;
  - The proposals of the Authority have been reviewed;
  - The contributions received together with the conclusions of the Authority have been presented;

Tuesday, May 10, 2005



# Thank You



Tuesday, May 10, 2005