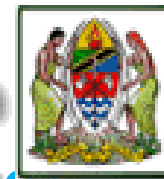


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TANZANIA COMMUNICATIONS REGULATORY AUTHORITY

**9th ANNUAL DIGITAL SWITCHOVER FORUM
AFRICA, IN ARUSHA, TANZANIA FROM 11th TO
14th FEBRUARY, 2014**

**A MARKET LED APPROACH TO DIGITAL
DIVIDEND REVIEW FOR FINANCING DIGITAL
BROADCASTING MIGRATION**

PRESENTED BY

ENG. Dr. JOHN ANDREW MPAPALIKA



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AGENDA

- 1 SPECTRUM FOR BEGINNERS**
- 2 DEFINITION OF THE DIGITAL DIVIDEND AND ITS APPLICATIONS**
- 3 IMPORTANT DECISIONS OF WRC 07 AND WRC 12**
- 4 DIMENSIONING OF THE DIGITAL DIVIDEND**
- 5 HOW CAN THE DIGITAL DIVIDEND BE BEST DIVIDED?
*MARKET LED APPROACH VERSUS ASSIGNMENT***
- 7 CONCLUSION**



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1. SPECTRUM FOR BEGINNERS

- **SPECTRUM CAN BE DEFINED AS A RANGE OF ELECTROMAGNETIC (RADIO) WAVES PROPAGATING IN FREE SPACE.**

❖ **THESE ELECTROMAGNETIVE WAVES ARE CLASSIFIED INTO FREQUENCY BANDS (SEE NEXT SLIDE).**



1. SPECTRUM FOR BEGINNERS

0 FREQUENCY BANDS

No.	Radio frequency (RF) Bands	Initials	Frequency ranges	Wavelength	Characteristics
1	Extremely Low Frequency	ELF	3Hz - 30Hz	$10^5 - 10^4$ km	Ground waves
2	Super Low Frequency	SLF	30 Hz - 300Hz	$10^4 - 10^3$ km	
3	Utra Low Frequency	ULF	300Hz - 3000Hz	$10^3 - 100$ km	
4	Very Low Frequency	VLF	3 KHz - 30KHz	100 - 10 km	
5	Low Frequency	LF	30 KHz - 300KHz	10 - 1 km	
6	Medium Frequency	MF	300 KHz - 3 MHz	1 km - 100 m	Ground/Sky wave
7	High Frequency	HF	3 MHz - 30 MHz	100 - 10 m	Sky wave
8	Very High Frequency	VHF	30 MHz - 300MHz	10 - 1 m	Space wave
9	Ultra High Frequency	UHF	300 MHz - 3 GHz	1 m - 10 cm	
10	Super High Frequency	SHF	3 GHz - 30GHz	10 - 1 cm	
11	Extremely High Frequency	EHF	30 GHz - 300GHz	1 cm - 1 mm	
12	Tremendous High Frequency	THF	300 GHz - 3000GHz	1 mm - 0.1 mm	



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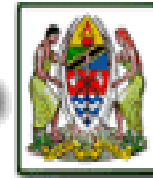
SPECTRUM FOR BEGINNERS.....

The most valuable spectrum under the present technological and economical conditions is the spectrum in the Ultra High Frequency (UHF) band particularly that of between 200MHz and 1000MHz. This spectrum known as **Pot of Gold** offers sweet spot combination of propagation of radio waves as follows:

- Travels at long distance and covers large areas at relative low costs;
- Travels inside buildings and gets good in door coverage
- Gets enough bandwidth for carrying broadband data services



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SPECTRUM FOR BEGINNERS.....

- At the moment, most of the sweet spot spectrum (200-1000MHz) is used by analogy television.
- The analogy television is spectrum inefficient technology; It uses large spectrum.

So what is going to happen with Digital Switch Over(DSO)?

- 1) The analogy television will be replaced by digital television.
- 2) The digital television is spectrum efficient technology;
- 3) It will use less spectrum; hence, saving of spectrum referred to as Digital Dividend.



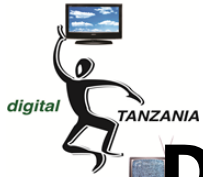
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DEFINITION OF THE DIGITAL DIVIDEND AND ITS APPLICATION

- **Definition**

According to ITU, the Digital Dividend can best be defined as “left over” (saving) spectrum in the VHF band (174-230MHz) and UHF band (470-862MHz) after the complete Analogue Switch Off (2012 EU objective, 2015 Region 1 objective and 2015 ITU deadline for protection of analogue).



DEFINITION OF THE DIGITAL DIVIDEND AND ITS APPLICATION.....

Applications

Many possible applications of the Digital Dividend are still under discussions at country, regional and international levels. However, three categories of applications can be identified as follows:

1 Broadcasting

Spectrum is needed for the improvement of terrestrial broadcasting services including increased number of programs, digital radio services (T-DAB) and Services with higher technical quality (notably HDTV)



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DEFINITION OF THE DIGITAL DIVIDEND AND ITS APPLICATION.....

Applications.....

2 Mobile Multimedia Broadcasting

Spectrum is needed for “converged” broadcasting services which are expected to be primarily “hybrids” of traditional broadcast and mobile communication services (like T-DMB/DVB-H network in combination with a GSM/UMTS/HSDPA/LTE network)



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DEFINITION OF THE DIGITAL DIVIDEND AND ITS APPLICATION.....

Applications.....

3 Fixed/Mobile Services

- Broadband mobile services 4G/LTE;
- Fixed broadband wireless access;
- Other potential new services.



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SOME IMPORTANT DECISIONS OF WRC 07 AND WRC 12 RELATED TO DIGITAL DIVIDEND

WRC 07 DECISION

Concluded that in Region 1 the 790-862MHz sub-band would be allocated on co-primary basis to mobile in addition to broadcasting and fixed services as from 2015, subject where necessary, to technical coordination with their countries.

This means that the 790-862MHz sub-band will also become the Digital Dividend after the DSO in June 2015.



IMPORTANT DECISIONS OF WRC 07 AND WRC 12 RELATED TO DIGITAL DIVIDEND.....

WRC 12 DECISIONS

- Most of the African countries determined their positions on the allocation of the 790-862MHz to the mobile services;
- Also 15 Member States of the SADC countries made their commitment to allocate the 790-862MHz to the mobile services;
- There is a great pressure from telecoms operators particularly from Africa to allocate uniquely the 790-862MHz to fixed/mobile services.



DIMENSIONING OF THE DIGITAL DIVIDEND

Size of the Digital Dividend can vary from country to country and depends on the regulator's objectives. However, it can be dimensioned/determined by the following:

- 1 Assess how much spectrum is precisely used by the existing analogue television;
- 2 Assess how much spectrum is precisely used by the digital television.
- 3 The remaining spectrum (1-2) if any, is generally considered to be part of the digital dividend that can be allocated to services other than broadcasting (fixed/mobile services).



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DIMENSIONING OF THE DIGITAL DIVIDEND.....

- The assessment of the digital television includes but not limited to the following technical factors:
 - 1. The use of Single or Multi Frequency Networks (SFN or MFN);
 - 2. The applied modulation techniques;
 - 3. The required bit rate per service (HDTV or SDTV);
 - 4. The applied compression technology (MPEG 2 or 4);
 - 5. Re-engineering of antenna
- Analysis of propagation of radio waves.



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DIMENSIONING OF THE DIGITAL DIVIDEND.....

Types of the Digital Dividend

- The Digital Dividend to be formed from the left over spectrum after the ASO;
- The Digital Dividend in the 790-862MHz to be approved by WRC 15 in 2015;



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HOW CAN THE DIGITAL DIVIDEND BE BEST DIVIDED? *MARKET LED APPROACH VERSUS ASSIGNMENT*

ASSIGNMENT

- Over 20 years most of Regulators in the world have been using assignment approach to release their frequencies;
- The assignment approach has many problems. One of them is failure to estimate exactly the market value of the assigned frequencies especially the competitive frequency bands.



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HOW CAN THE DIGITAL DIVIDEND BE BEST DIVIDED? *MARKET LED APPROACH VERSUS ASSIGNMENT*

MARKET LED APPROACH

- The Digital Dividend can be best released by using the Market Led Approach through HYBRID tendering process for the following 2 main reasons:
- Value for money; because of high value of the Digital Dividend;
- Promote optimum spectrum use over time.



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HOW CAN THE DIGITAL DIVIDEND BE BEST DIVIDED? *MARKET LED APPROACH VERSUS ASSIGNMENT*

HYBRID TENDEERING PROCESS

- Hybrid tendering process involves a combination of beauty contest and auction;
- The beauty contest pre-qualifies potential bidders who will go for the second stage for auctioning;
- The winner is selected on the basis of auctioning.



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HOW CAN THE DIGITAL DIVIDEND BE BEST DIVIDED? *MARKET LED APPROACH VERSUS ASSIGNMENT*

GUIDELINE ON DIGITAL DIVIDEND REVIEW

The following international and regional organizations are urged to prepare Guidelines on Digital Dividend Review in order to assist African countries to release their Digital Dividend and other pot of gold spectrum (competitive frequency bands) at market value for financing the digital broadcasting migration and other public services:

- International Telecommunication Union (ITU);
- Commonwealth Telecommunications Organisation (CTO)
- African Telecommunication Union (ATU);
- East African Communications Organisation (EACO)



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CONCLUSION

- Digital broadcasting migration is not only about transition from analogue to digital signals, but also it is a potential source of revenue generation by the governments for funding the digital broadcasting migration and other public services;
- Regulators have been urged to release their Digital Dividend and other pot of gold spectrum (competitive frequency bands) by using the Market Led Approach because of value for money;
- The Hybrid tendering process has been recommended to be used for the Market Led Approach.



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CONCLUSION

THANK YOU FOR YOUR ATTENTION

mpapalika@tcra.go.tz