

# *Migration to Digital TV*

## *ASO/DSO*

### *Digital Dividend*

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# Overview

- ▶ Why changing? (advantages and disadvantages)
- ▶ Pertinent transition questions
- ▶ Possible Digital Dividend(s):
  - Challenges and International discussions (WRC)
- ▶ ITU input for the transition

# *Basic Definitions*

- ▶ **ASO:** Analogue Switch–Off: Stop broadcasting in analogue Mode
  
- ▶ **DSO:** Digital Switch–Over: Migration process from analogue to digital broadcasting

# Why going Digital?

- ▶ Any choice? Really?
- ▶ **Advantages:**
  - New possibilities to the viewers:
    - Additional number of programs
    - Reduction of transmission costs (Sharing infrastructure)
    - Additional reception modes: portable and mobile reception
    - Improve quality of image and sound including HDTV
    - Additional type of services: interactivity, Electronic Program Guides, etc.
  - For the regulators:
    - Fair competition: To develop a terrestrial platform competitive with other platforms (i.e. cable, satellite etc...)
    - Efficient use of spectrum
- ▶ **Disadvantages:**
  - New and big costs, new planning work, new technology (training, experts...)

# Pertinent transition questions

**What?**

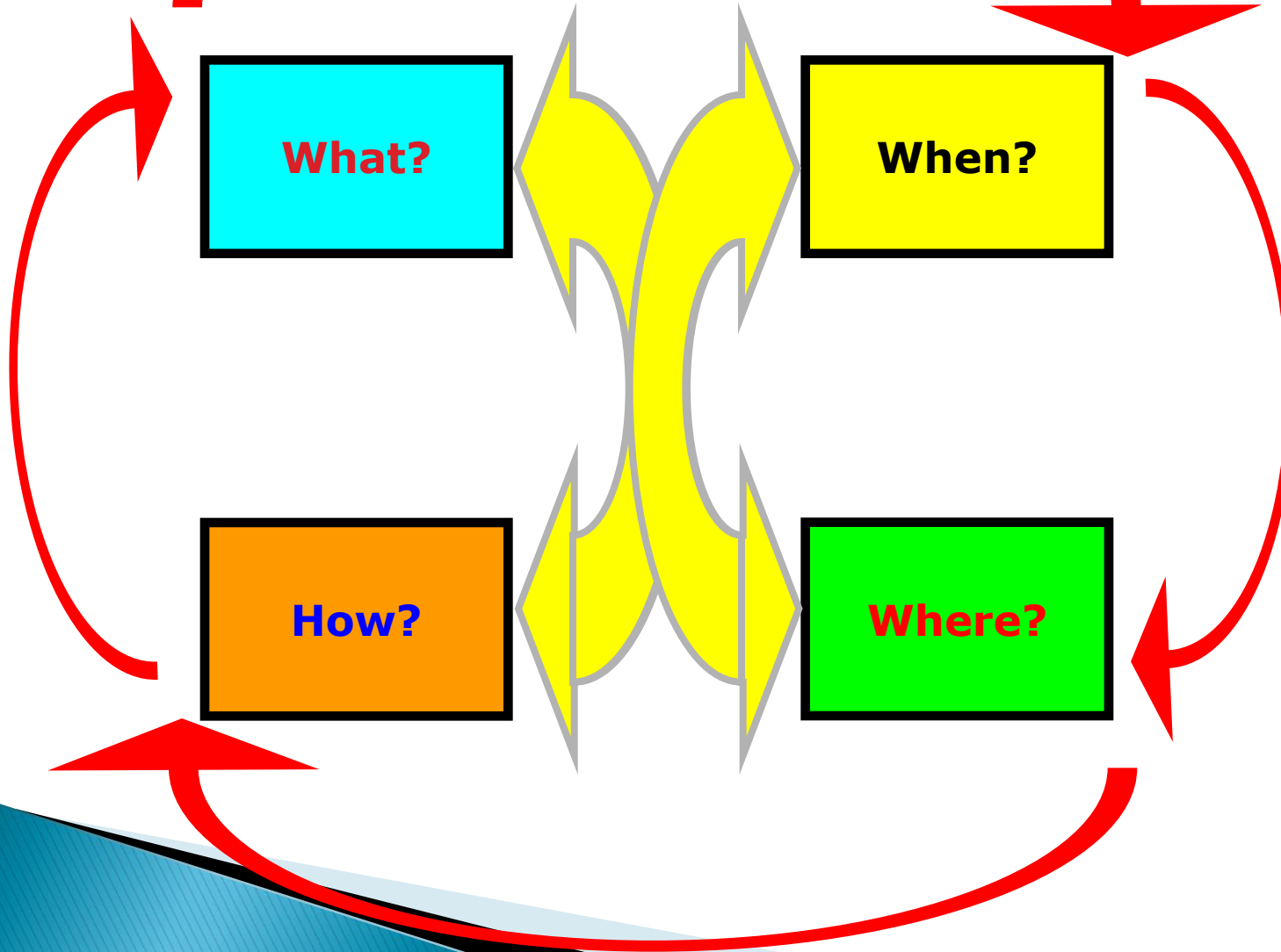
**How?**

**When?**

**Where?**

- ▶ What?
  - Technical standards – Selection of appropriate DTT standard
  - Decision has to be made. Cannot always wait for newer technologies.
- ▶ How?
  - ASO/DSO models
  - Consider Regulatory and Technical aspects
- ▶ When?
  - Define date for ASO
    - Coordinate with your neighbours – Issues if the ASO is not synchronized.
- ▶ Where?
  - Where to start
  - Which coverage?
  - Stations at the border

# *Pertinent transition questions*



# *Selection of appropriate DTT standard*

- ▶ **ASTC (System A) : Advanced Television Systems Committee**
  - ATSC-M/H- Advanced Television Systems Committee Mobile & Handheld.
- ▶ **DVB:**
  - DVB-T : Digital Video Broadcasting Terrestrial (System B)
  - DVB-H: Digital Video Broadcasting Handheld
- ▶ **ISDB-T: Integrated Services Digital Broadcasting Terrestrial (System C)**
  - SBTVD: Adapted by Brazil
- ▶ **DTMB: Digital Terrestrial Multimedia Broadcast (System D):**

**What?**

# *Description of Digital Television Broadcasting systems – 1<sup>st</sup> generation*

<b>Standard</b>	<b>Channel spacing</b>	<b>Band</b>	<b>Modulation</b>	<b>Applicable standards</b>
<b>ATSC</b>	6 MHz	UHF/VHF	8-VSB	A/52,A/53, A/65, A/153
<b>DTMB</b>	8 MHz	UHF/VHF	OFDM	GB 20600-2006
<b>DVB-T</b>	6, 7 and 8 MHz	UHF/VHF	OFDM	EN 300 744
<b>DVB-H</b>	5, 6, 7 and 8 MHz	UHF/VHF	OFDM	EN 302 304
<b>ISDB-T</b>	6, 7 and 8 MHz	UHF/VHF	Segmented OFDM	ARIB STD-B31

See ITU-R Recommendations BT-1306, BT-1368



# 2<sup>nd</sup> Generation Broadcast Television

- ▶ increased spectral efficiency to accommodate
  - more programs or
  - the same number of programs
    - with a higher audio/video quality
    - Coverage area largely increased
- ▶ **Better robustness/service specific robustness**
  - New generation FEC and higher constellations resulting in capacity gain
  - Rotated constellations (high code rates in demanding transmission channels)
  - Extended interleaving (bit, cell, time, frequency)
- ▶ **Better image:** Video coding (H.264/MPEG4 AVC). Gain in broadcast transmission
- ▶ **SFN enhanced** to reduce frequency requirements
- ▶ New antenna technologies(MISO,MIMO)

# *ASO/DSO Models*

- ▶ **Simulcast:** broadcasting analogue and Digital
  - Everybody still can watch terrestrial TV
  - Frequency resource to accommodate Analog & Digital
  - Transition Period
  
- ▶ **National shut-off of analogue services:**
  - Clear and optimized use of frequencies
  - Risk of non covered regions or viewers not ready

**How?**

# *Planning the ASO/DSO*

## *Regulatory aspects*

### ▶ **Establish legal framework**

- Define ASO/DSO strategy (Implementation and timelines)
- Ensure appropriate coverage
- Licenses strategy :free-to-air or/and pay-tv services
- Create a funding, if needed and if possible, to ensure sufficient financial structure
- To ensure adequate digital receivers are on the market at a reasonable price.
- Ensure a good communication campaign to inform the Viewers and deploy means to assist (Web site, TV and Radio spots...)

# *Planning the ASO/DSO*

## *Technical considerations*

- ▶ **Modify/update the Frequency Assignment Plan** (if simulcast consider analog & digital)
- ▶ **Coverage calculation** (MFN/SFN)
- ▶ Taking into account a **possible Digital Dividend**
- ▶ **Coordination with neighboring countries** (synchronize/harmonize & protect your national coverage)
- ▶ If simulcast, ensure compatibility between digital and analogue
- ▶ **Notify to MIFR for international recognition**

# *Transition deadlines*

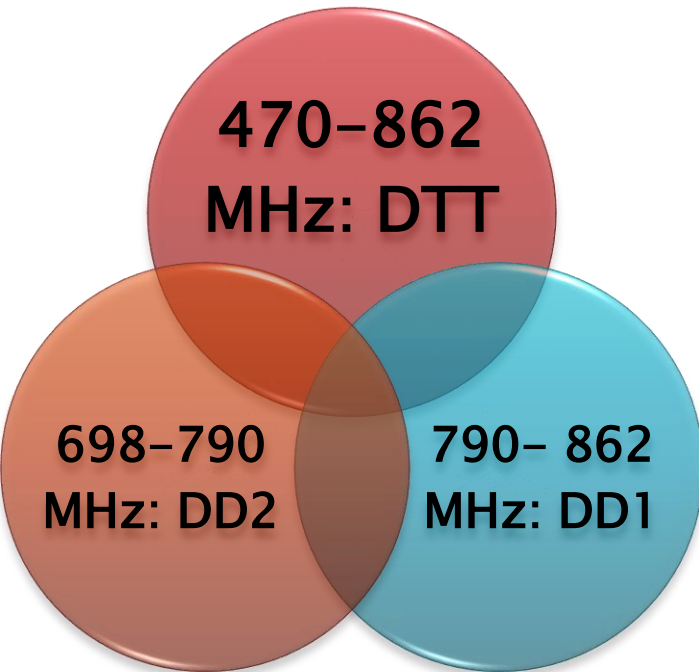
- ▶ In Region 1 – Governed by the GE06 Agreement
  - 17 June 2015
  - 2020 for VHF in some countries
- ▶ In Region 2 & 3 – No regional Agreement
  - Consider sub-region or region
  - Bilateral/multilateral agreements
    - MOU, LOU

**When?**

# *Outcome of WRC-12*

## *Possible future DD*

# Digital Dividend (s) Region 1



- ▶ Is the amount of spectrum in the frequency band 470–862 MHz to be released in the switchover from analogue to digital TV, at latest at the end of the transition period 2015 (GE06 Agreement).
- ▶ The concerned frequency band is 790–862 MHz
- New DD : 698–790 MHz band ?  
(second digital dividend for Mobile )  
identification for IMT services, in addition to 800 MHz

The TV broadcasting industry would like to retain all of this spectrum to develop and enhance its services ->High Definition TV, 3DTV, UHDTV...

Mobile industry would like to use the upper part of the band for mobile broadband

# *Situation after WRC-12: Frequency allocation in 470 – 862 MHz*

Region 1
<b>470-790 MHz</b> BROADCASTING  5.149 5.291A 5.294 5.296 5.300 5.304 5.306 5.311A 5.312 <b>5.312A</b>
<b>790-862 MHz</b> FIXED MOBILE except aeronautical mobile 5.316B 5.317A  BROADCASTING 5.312 5.314 5.315 5.316 5.316A 5.319

**5.312A** In Region 1, the use of the band 694-790 MHz by the mobile, except aeronautical mobile, service is subject to the provisions of Resolution **232 (WRC-12)**. See also Resolution **224 (Rev.WRC-12)**. (WRC-12)



Creation of **JTG 4-5-6-7** by the CPM (Conference Preparatory Meeting for WRC-15) immediately after WRC-12

Objective: Prepare **CPM Text** concerning **AI 1.2** and **AI 1.2**



# *Consideration of IMT in 470–790 MHz band*

- **Agenda Item 1.2 of WRC-15 (determined by WRC-12)**
  - 1.2 to examine the results of ITU-R studies, in accordance with **Resolution 232 (WRC-12)**, on the use of the frequency band 694-790 MHz by the mobile, except aeronautical mobile, service in Region 1 and take the appropriate measures;
- **Agenda Item 1.1 of WRC-15 (determined by WRC-12)**
  - 1.1 to consider additional spectrum allocations to the mobile service on a primary basis and identification of additional frequency bands for International Mobile Telecommunications (IMT) and related regulatory provisions, to facilitate the development of terrestrial mobile broadband applications, in accordance with **Resolution 233 (WRC-12)**;

**694-790 MHz**

**470-694 MHz a. o.**

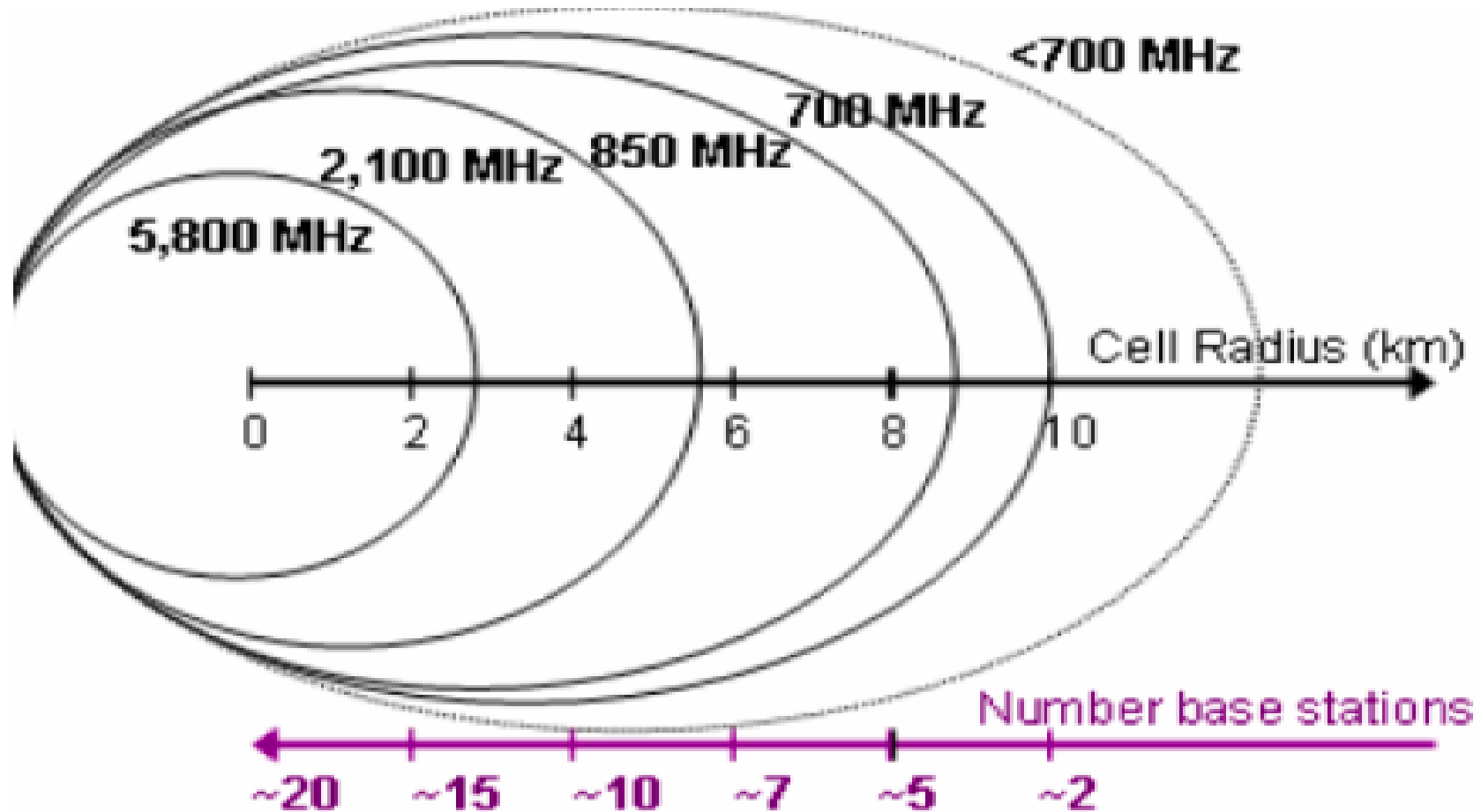
# *Candidate frequency bands for IMT*

- ▶ In accordance with *resolves 2* Resolution 233 (WRC-12), multiple bands have been nominated in JTG 4-5-6-7
- ▶ First in the series is: **470 – 694 MHz**  
(see Annex 3 to Joint Task Group 4-5-6-7 Chairman's Report)
  
- ▶ The arguments are
  - Harmonisation between ITU Regions
  - Leave subsequent choice of usage to the national governments

# *Possible scenarios after WRC-15*

- ▶ Risk/probability that after WRC-15 the whole UHF TV band will be allocated to MS for IMT (co-primary to BS): 470 – 890 MHz
- ▶ If it is the case, national regulators can then decide to allow all or part of that spectrum to be used by IMT.
- ▶ Broadcasters will lose their terrestrial distribution network to the benefit of satellite, cable and IPTV providers

# Why these bands ? Below 1 GHz



The propagation characteristics of spectrum

Source: BBC R&D.

# *Need for timely decision*

Timely decision is crucial for the development and timely availability of the service.

It requires:

- A Regional harmonisation framework
- Frequency coordination negotiations
- An allocation decision
- Refarming of existing services
- A Licensing process

*Thank you  
for your attention*

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# ***Work of ITU on the Transition***

Reports, Recommendations, Reports,  
Handbooks

# *ITU-R Recommendations ASO/DSO*

<b><u>BT.1125</u></b>	Basic objectives for the planning and implementation of digital terrestrial television broadcasting systems
<b><u>BT.1368</u></b>	Planning criteria, including protection ratios, for digital terrestrial television services in the VHF/UHF bands
<b><u>BT.1306</u></b>	Error correction, data framing, modulation and emission methods for digital terrestrial television broadcasting
<b><u>BT.1877</u></b>	Error-correction, data framing, modulation and emission methods for second generation of digital terrestrial television broadcasting systems
<b><u>BT.2033</u></b>	Planning criteria, including protection ratios, for second generation of digital terrestrial television broadcasting systems in the VHF/UHF bands



# ITU-R Reports

## ASO/DSO

[BT.2035](#)

Guidelines and techniques for the evaluation of digital terrestrial television broadcasting systems including assessment of their coverage areas

[BT.2049](#)

Broadcasting of multimedia and data applications for mobile reception

[BT.2140](#)

Transition from analogue to digital terrestrial broadcasting

[BT.2215](#)

Measurements of Protection Ratios and Overload Thresholds for Broadcast TV Receivers

[BT.2247](#)

Field measurement and analysis of compatibility between DTTB and IMT

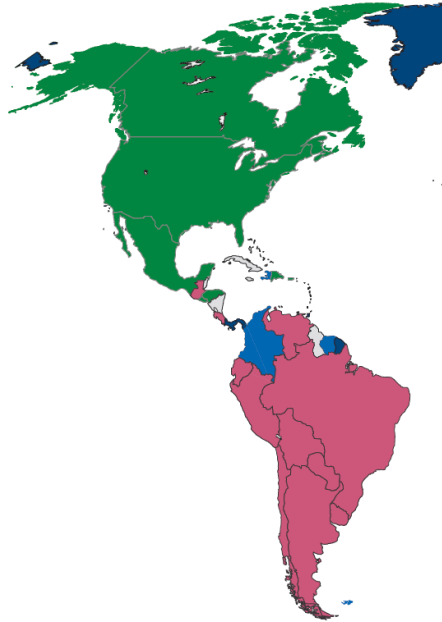
[BT.2254](#)

Frequency and network planning aspects of DVB-T2

[BT.2265](#)

Guidelines for the assessment of interference into the broadcasting service

# *DTT planning Parameters*



Source: DVB.org

- ITU-R Recommendation BT. 2033 considering only DVB-T2 standard at the moment.

Considers Protection for:

- a DVB-T2 signal interfered with by a DVB-T2 signal
  - A DVB-T2 signal interfered with by Mobile
- 
- ITU-R Recommendation BT. 1306

Possible solutions:

- Contribution to ITU to be submitted to SG6
- Bilateral/multilateral agreements

# ITU Documents on DSO-ASO

## ▶ Handbooks:

- Guidelines for the transition from analogue to digital broadcasting
- DRAFT TEXT OF HANDBOOK: *DIGITAL TERRESTRIAL TELEVISION (DTTB) IMPLEMENTATION*- VOLUME 1: NETWORKING ASPECTS OF DIGITAL TV BROADCASTING- SG6 of ITU-R

