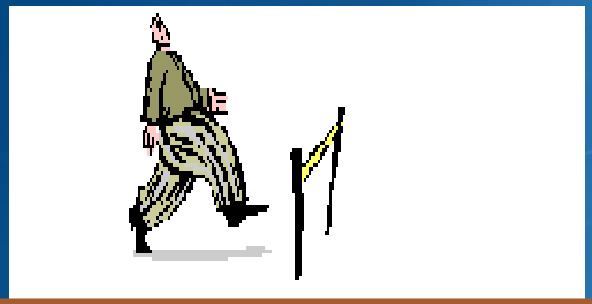
Digital Dividend(s) in Region 1

Ilham Ghazi
Ilham.ghazi@itu.int
Radiocommunication Engineer
BR/ITU

International Telecommunication Union

End of Transition (GE06)

1



Transition accomplished!
Let us start transition to DVB-T2

2

Transition going-on. Only DVB-T2?

3

Start of Transition: DVB-T2

2nd Generation
3d,4th..???

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Overview: UHF Band for Region1

- ASO/DSO status in Region 1
- Digital Dividend (s)
- How to ensure the max of DDs?
- 700/800 MHz situation in Region 1
- Why the 700 MHz allocated to mobile?
- 700/800: Feasibility and complications
- Recommendations

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Some of DSO/ASO advantages

New possibilities to the viewers:

- Additional number of programs
- Reduction of transmission costs (Sharing infrastructure)
- Additional reception modes: portable and mobile reception
- Improved quality of image and sound including HDTV
- Additional type of services: interactivity, Electronic Program Guides, etc.

Attractive

for Regulators :

- Fair competition: To develop a terrestrial platform competitive with cable and satellite platforms
- To be in line with GE06 Plan (as from 2015 no protection of analogue TV)
- Free a part of the UHF Band for mobile Broadband (WRC-07/WRC-12)

Efficient use of Spectrum

TV operators/content providers:

Significant decrease in transmission costs comparing to analogue

- Power costs: DTT requires less energy to ensure the same coverag for the analogue,
- Investment cost: One DTT transmitter to broadcast multiple channels/programs.
- Development of new TV services without spectrum constraints.
- Offering of new innovative services (mobile TV , data, games, interactivity, VoD,...).

Good for the environment

ational
ommunication

DVB-T2 to gain even more spectrum?

DVB-T2

- At least 30%-50% higher transmission capacity, more efficiency
- improved SFN performance and larger scale SFN than DVB-T
- DVB-T2 provides Data rates between 50% and 90% higher than DVB-T for the same level of robustness
- DVB-T2 provides Ability to reuse existing reception antennas.
- **reduction in the peak** to average power used in the transmitter station by 25%

- 2011 update added the T2-Lite subset for mobile and portable reception.
- Supports SD, HD, UHD, mobile TV, or any combination

Compression (in 1 channel 8MHz)

- **MPEG2/H.262:**
  - 4-6 programs SDTV
- **MPEG4 AVC/H.264:**
  - 6-10 SDTV programs
  - 4-6 HDTV programs
- **H.265 High Efficiency Video Coding (HEVC):**
  - double the data compression ratio compared to H.264,
  - can support **8K UHD**

NEW

Price?

- A multitude of DVB-T2 set-top boxes and integrated TV receivers are now available and prices have already dropped, ex.: STP to around 25 USD.
- The price difference between comparable DVB-T and T2 integrated TV sets is already negligible.

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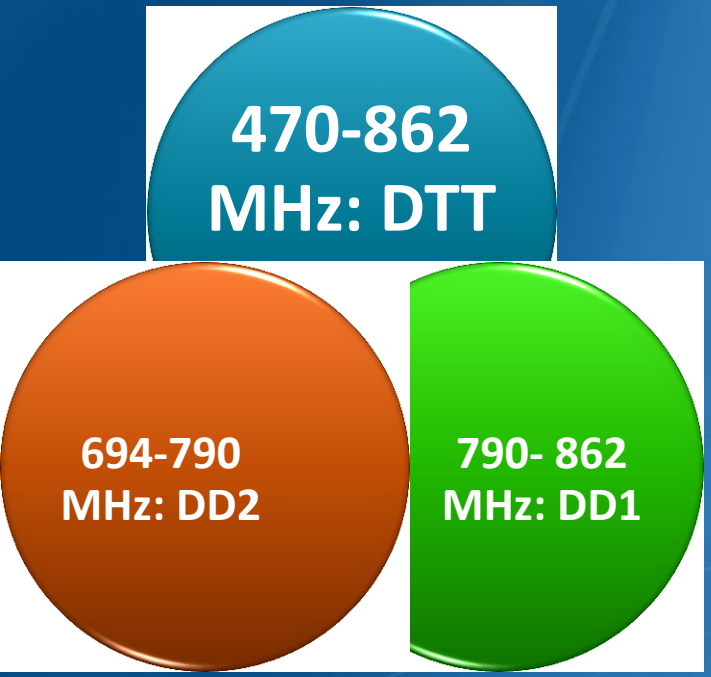
Number of programmes per multiplex for fixed reception with DVB-T 64-QAM-2/3-8K-GI 1/32 and DVB-T2-256-QAM-2/3-16K-GI 1/32

Format	Source coding	No of progs DVB-T	No of progs DVB-T2	No of progs DVB-T	No of progs DVB-T2
		Fixed MUXing		Fixed MUXing FUTURE	
SD	MPEG-2	6	10	6	10
SD	MPEG-4/AVC	9	13	10	15
HD-720p	MPEG-4/AVC	3	4	3	5
HD-1080i	MPEG-4/AVC	2	4	3	4
		Statistical MUXing		Statistical MUXing FUTURE	
SD	MPEG-2	8	13	8	13
SD	MPEG-4/AVC	11	16	13	19
HD-720p	MPEG-4/AVC	3	5	3	5
HD-1080i	MPEG-4/AVC	3	4	3	5

Digital Dividend (s)



- Is the amount of spectrum in the frequency band 470-862 MHz to be released after the switch-off of analogue TV
- DD1: The band 790-862 MHz (WRC-07) Region 1
- DD2 : The band 694-790 MHz band (WRC-12) Region 1

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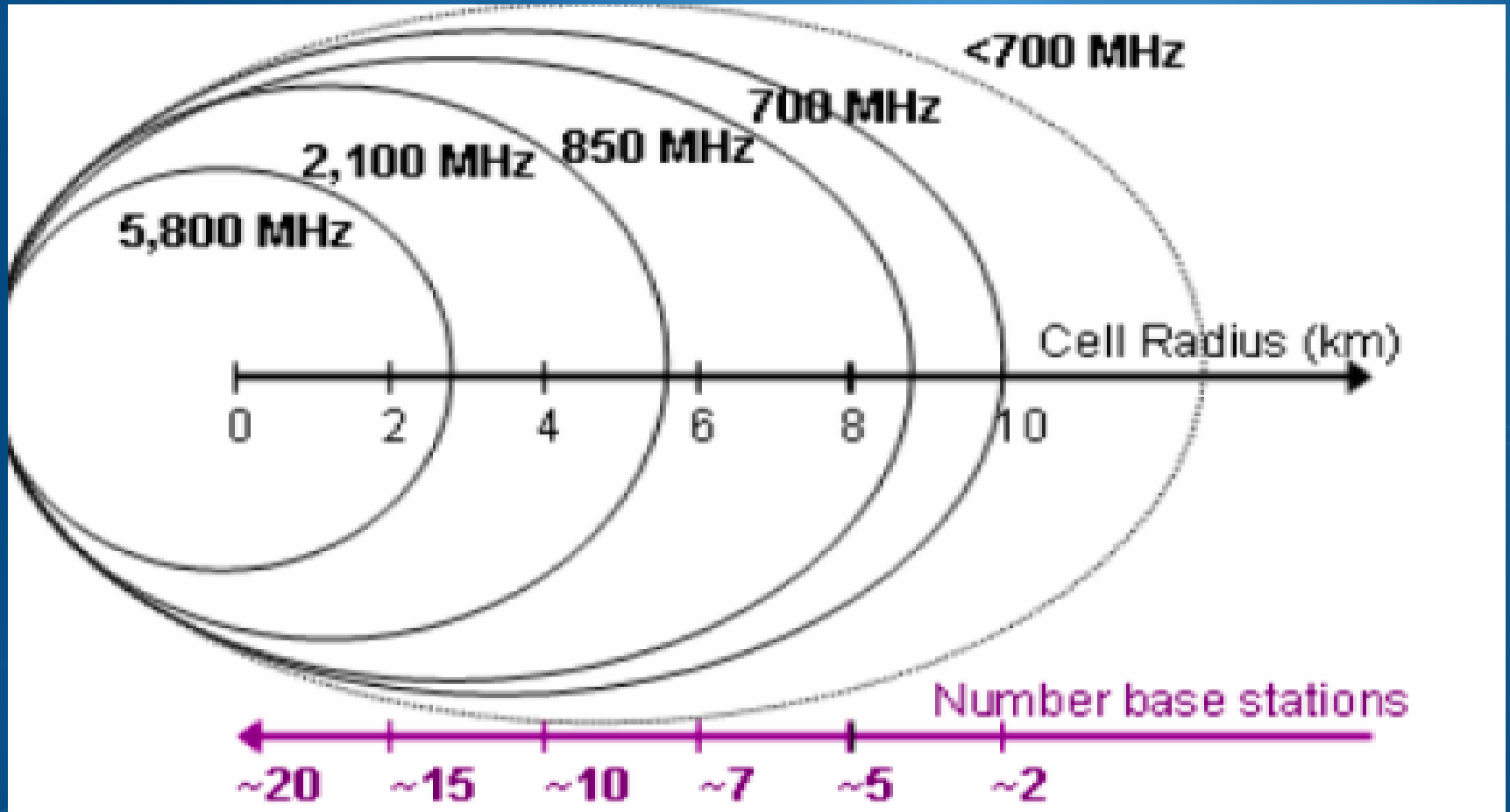
Why these bands (700 and 800 MHz)?



The propagation characteristics of spectrum

Source: BBC R&D.

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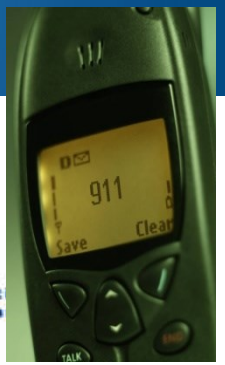
Benefits of broadband access

- **Infrastructure:** Simple telecommunications have served us well, but in the 21st century, the social and economic development of every country on Earth will depend upon broadband networks
- **Social:** They are now as necessary a part of a nation's infrastructure as roads and energy supplies, and potential for human progress - in delivering health services and in education is obvious.
- **Economical:** Broadband also offers many other ways to advance development and generate economic activity.
- **Human:** In addition, broadband networks can help us to manage climate change, natural disasters and other global crises.



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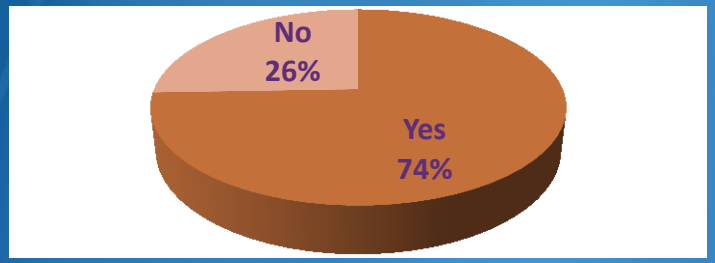
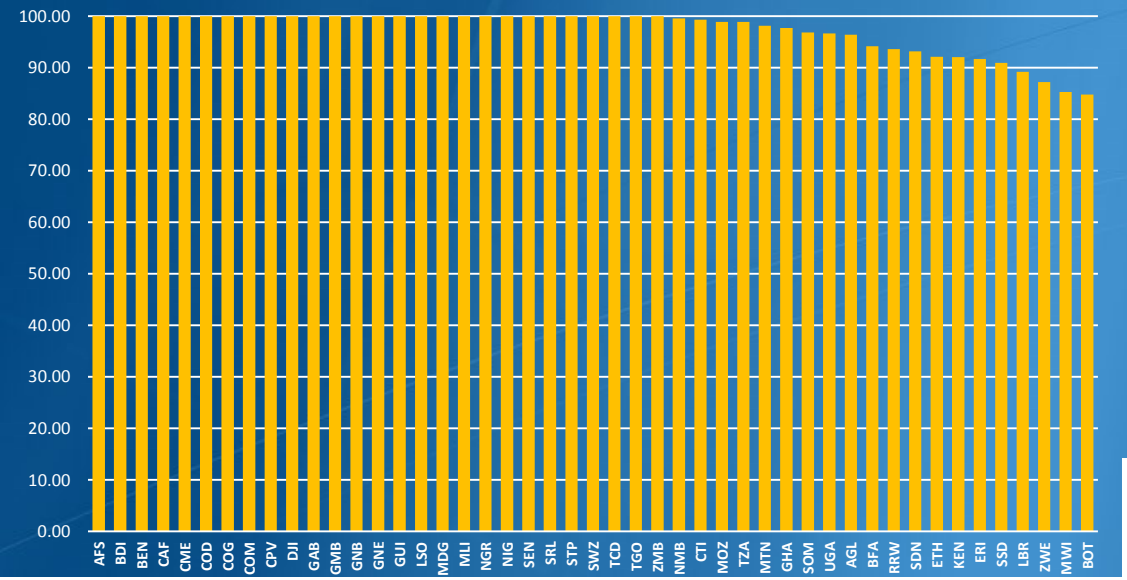
DDs: Coordination meetings for Sub-saharan Africa

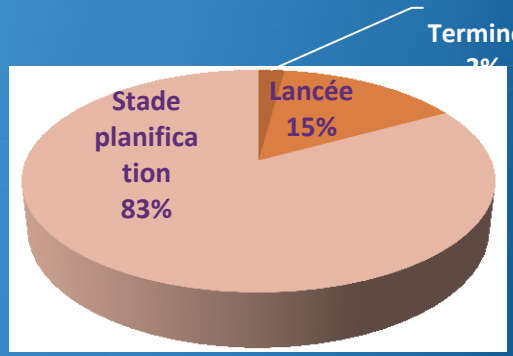
Countries having modified the GE06 Plan



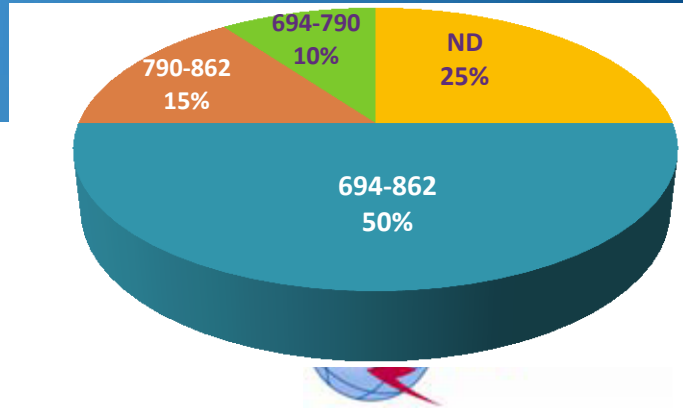
Percentage of assignable channels



ASO in Sub-Saharan Africa



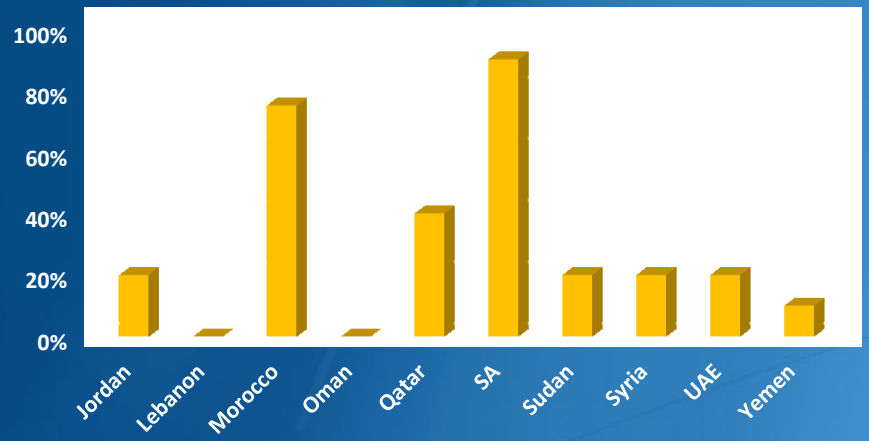
Identified DD (21 Countries)



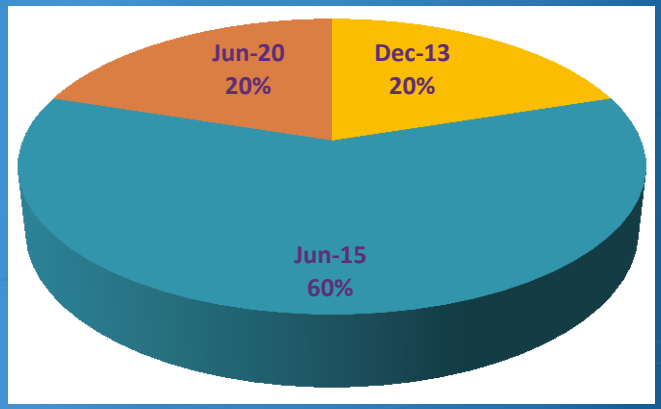
DDs in Arab countries

Morocco: Tender in 2012. Implementation beginning of 2014

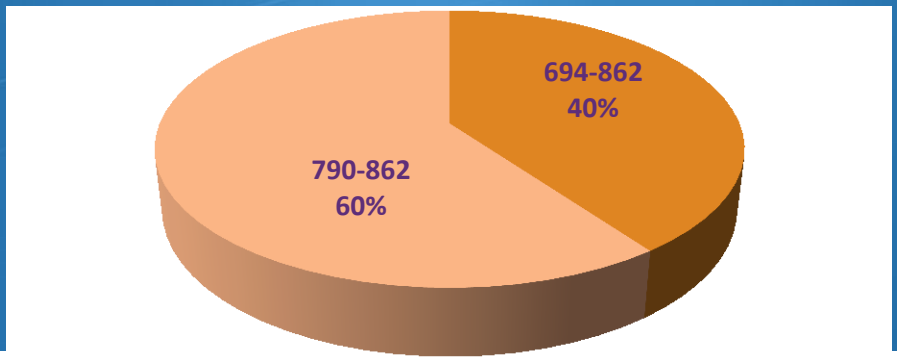
Level of implementation of digital TV



ASO date



Identified DD (10 countries)



UAE (May 2013): The UAE has become the first country in ITU Region 1 – covering Europe, the Middle East and Africa – to allocate spectrum in both the 700MHz and 800MHz bands to mobile broadband.

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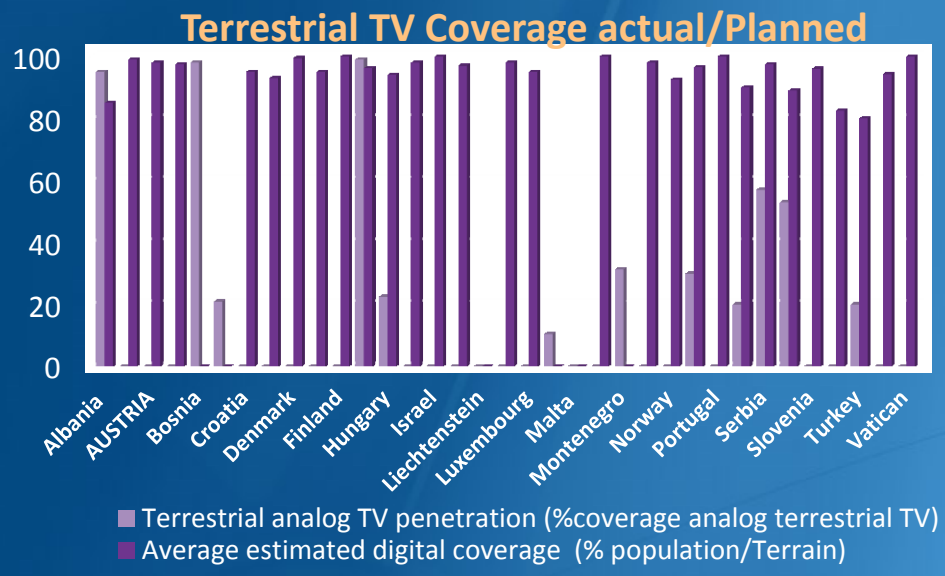
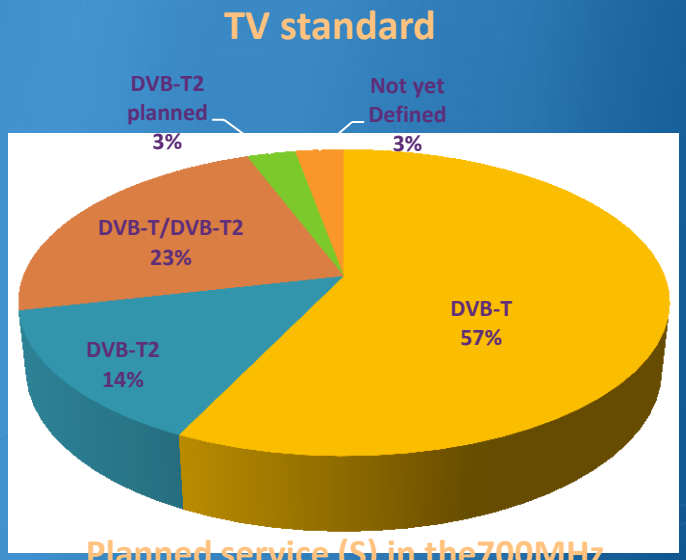
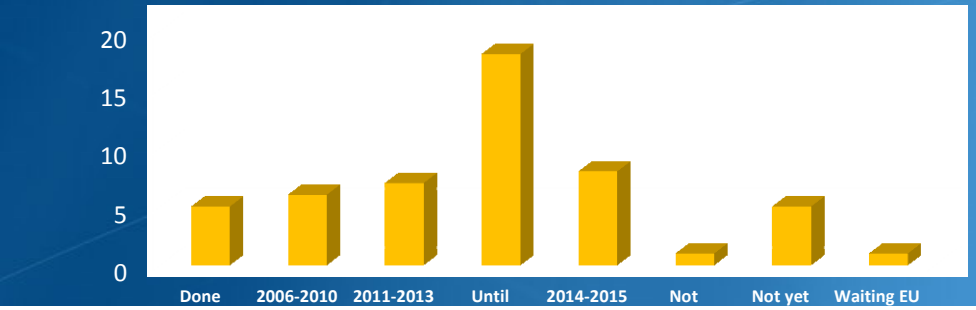
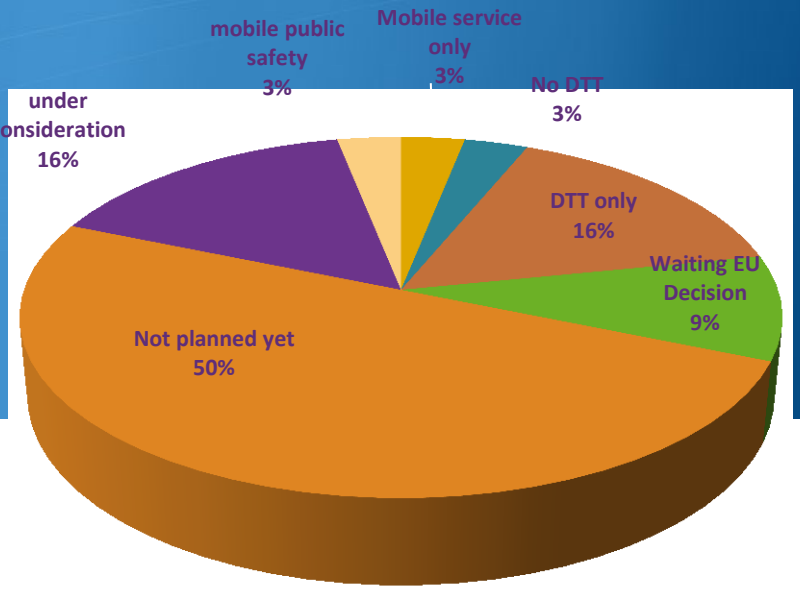
DDs in Europe (ex. RCC)









- 2010 EC Decision 2010/267/EU to harmonize the 800 MHz band the 800 MHz band for Mobile Broadband : By 1 January 2013.
- The Commission shall grant specific derogations until 31 December 2015 for Member States with exceptions

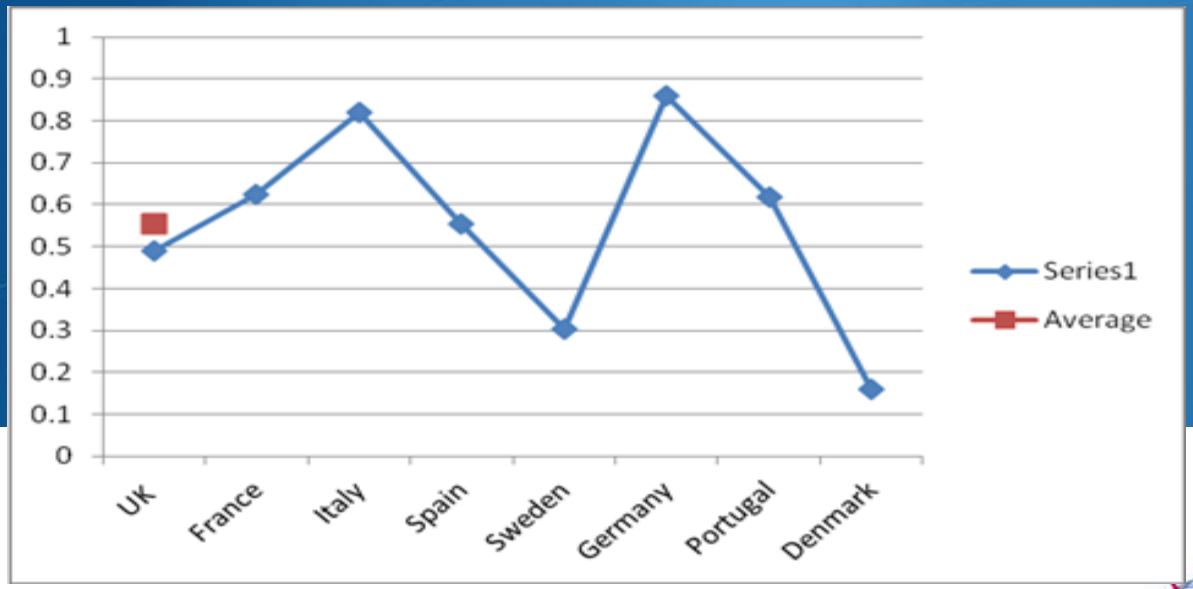
Example of Auctions (800MHz)

*: 800 MHz with other frequency bands

Country	Amount of auction in €	Year of auction
Austria	2 billion	**Oct-2013**
Belgium	**360 Million**	**Nov-13**
Croatia	**40 million**	**Sep-12**
Czech Republic	**266 million**	**Nov-13**
Denmark	**99Million**	**2012**
Finland	**108 Million**	**30.10.2013**
France	**2.6 billion**	**Dec-11**
Germany	**3.57 billion**	**2010**
Ireland*	**854.64 million (spectrum fees included until 2030)**	**2012**
Italy	**2.96 billion**	**Jan-13**
Lithuania	**2,4 million**	**Oct-2013**
Latvia	**4.7 million**	**Oct-2013**
Netherlands	**3.8 billion**	**Dec-2012**
Portugal	**270 million**	**2012**
Romania*	**682 million**	**Sep-12**
Spain	**1,3 billion**	**Jul-05**
Sweden	**233 million**	**2009**
Switzerland*	**CHF 996.3 million**	**Jul-05**
UK	**2.7 billion**	**Feb-2013**

800 MHz Spectrum value

DD auctions Europe (800 MHz)	UK	France	Italy	Spain	Sweden	Germany	Portugal	Denmark	Switzerland	Average
Year of award	2013	2011	2011	2011	2011	2010	2011	2012	2012	
Euro/MHz/Pop (Using PPP 2012)	0.49	0.625395	0.8194	0.5543	0.304865	0.86037	0.61696	0.160265	n/a*	0.553944
US$/MHz/Pop	0.65	0.88	0.8	0.5	0.59	0.9	0.55	0.38	0.65625	
Format	CCA	tender	SMRA	SMRA	SMRA	SMRA	SMRA	CCA	CCA	
Type	800 & 2.6	tender	multiband	multiband	single band	multiband	multiband	single band	multiband	
Lic. Conditions	yes	yes	yes	yes	yes	yes	yes	yes	yes	
Lic. duration	20	20	18	18	25	15	15	22	16	



The Graph relates to Euro/MHz/Pop (Using PPP 2012)

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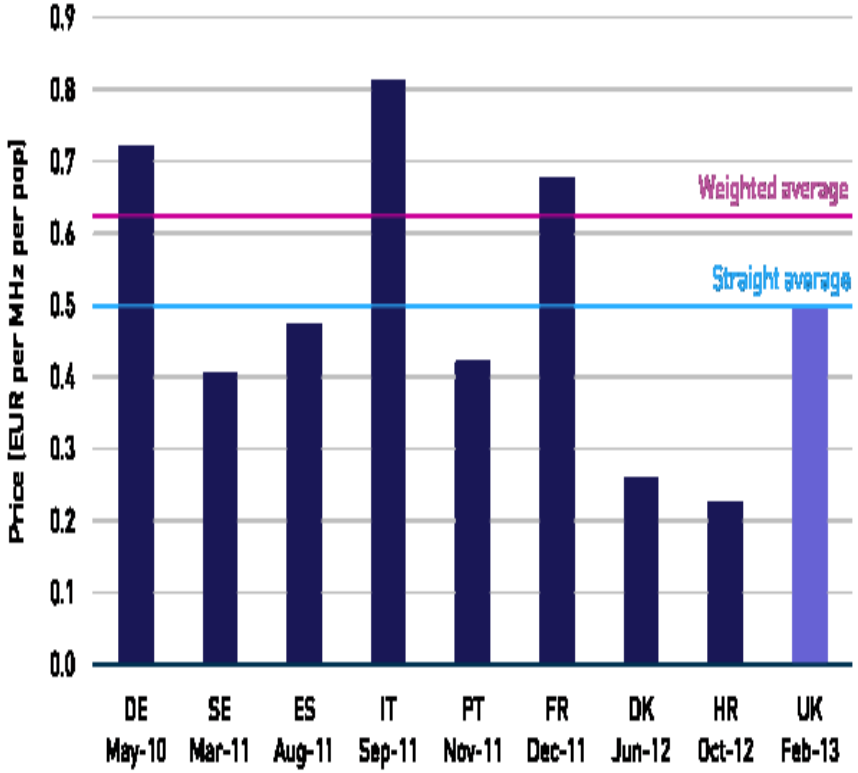
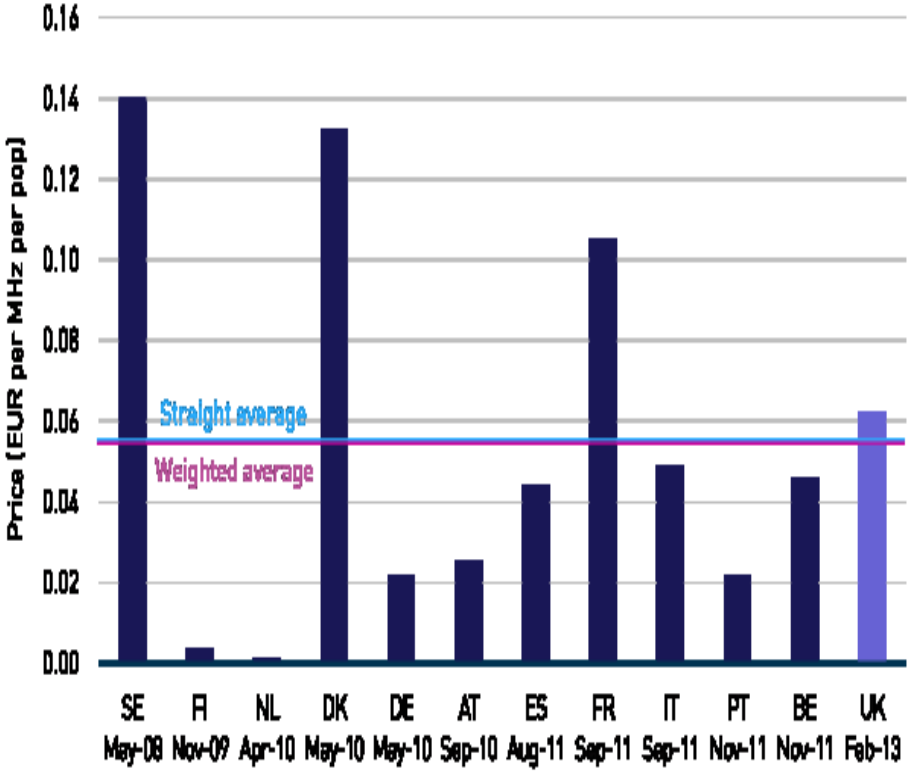
Prices paid in EU 800MHz auctions



Prices paid in EU 2600MHz auctions



Source: Analysys Mason, 2013

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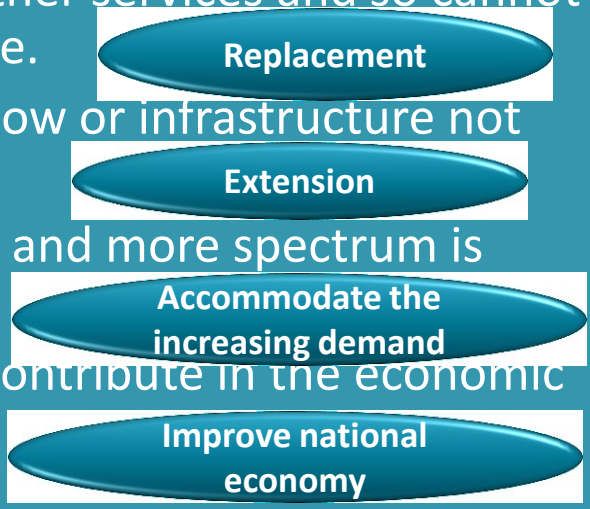
LTE 800 MHz in Region1. Source http://4g-map.info/

Why 700 MHz for MEA?

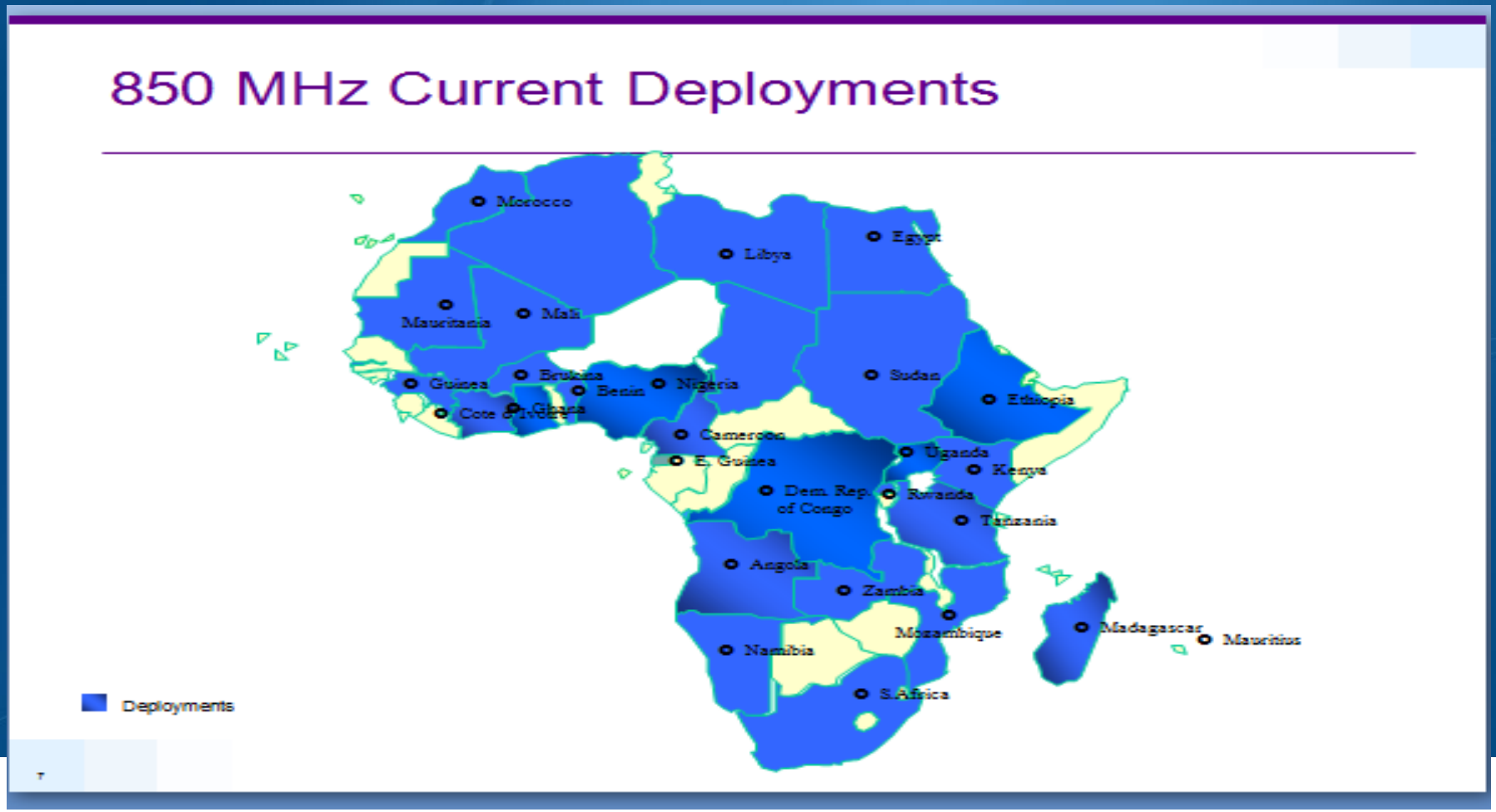
- Several countries in MEA use 850MHz for other services and so cannot make the 800 MHz band available for Mobile.
- The penetration of fixed broadband is very low or infrastructure not sufficient.
- Demand for mobile data services is growing and more spectrum is needed to accommodate this demand
- A dynamic wireless broadband industry to contribute in the economic growth and job creation.



- **Limited use of terrestrial TV**
  - Low penetration for Terrestrial broadcasting , compared with other TV platforms and/or provides few TV channels.
  - L**imited number** of TV channels.
  - Late introduction allows the choice of DVB-T2→ very efficient spectrum consuming : Larger DD

- the 700MHz allocation in Region1 raises the prospect of harmonization with other ITU world regions.

850 MHz current CDMA deployment



Feasibility in 700 MHz

- Countries in MEA started planning DSO later than European and are well positioned to use newer technologies, such as DVB-T2 and MPEG-4/H.256, which offer better spectral efficiency.
  - Spectrum in the 700MHz band could be made available by most regulators in the MEA **before 2015**

- In Europe, in contrast, most countries planned DSO some years ago and hence use DVB-T with multi-frequency networks (MFNs) for an extensive DTT. Substantial planning would be needed to migrate to the more-recent technology option of DVB-T2 with single-frequency networks (SFNs).
  - expected to be available in Europe until around **2022–2023** because of the complexity of moving DTT from this band.

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Studies in Europe on the 700 MHz

- **EU initialized investigation of current spectrum utilization, and forecasts for future needs by all stakeholders** common methodology has been defined, and results are targeted for **2015**. **CEPT mandated by EC for studies related to700 MHz, so to prepare a possible decision to implement 700 MHz for mobile Broadband**

- **EU Radio Spectrum Policy Group** (EU Administrations)has set a draft Opinion on Wireless Broadband recommending the EC to set a strategic action plan for this purpose, including **not only 700**, but looking at the whole UHF band.

- In **the UK**: Ofcom, has issued a consultation on future use of the 700MHz band to be released for mobile use in the UK from around 2018, subject to the necessary replanning of DTT services. It is also proposed that spectrum in the 600MHz range–originally part of the UK‟s „digital dividend‟ created from the switch-off of analogue TV services–might be made available for DTT use,

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700 MHz in Europe

- Germany's Federal Network Agency announced plans to release 700MHz spectrum for mobile in 2014.
- The Finnish authorities strongly believe in the value of freeing up spectrum for mobile use. The country is keen to clear DTT from the 700MHz spectrum.
- Russia is the only Region 1 country to have already awarded spectrum in the 700MHz band (2x 30 MHz)(720-750 MHz UL/ 761-791 MHz DL).
- Uzbekistan and Kazakhstan LTE trials.

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700 MHz in MEA countries

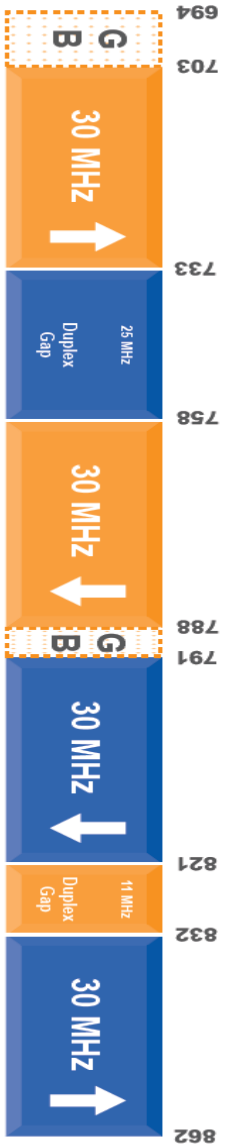
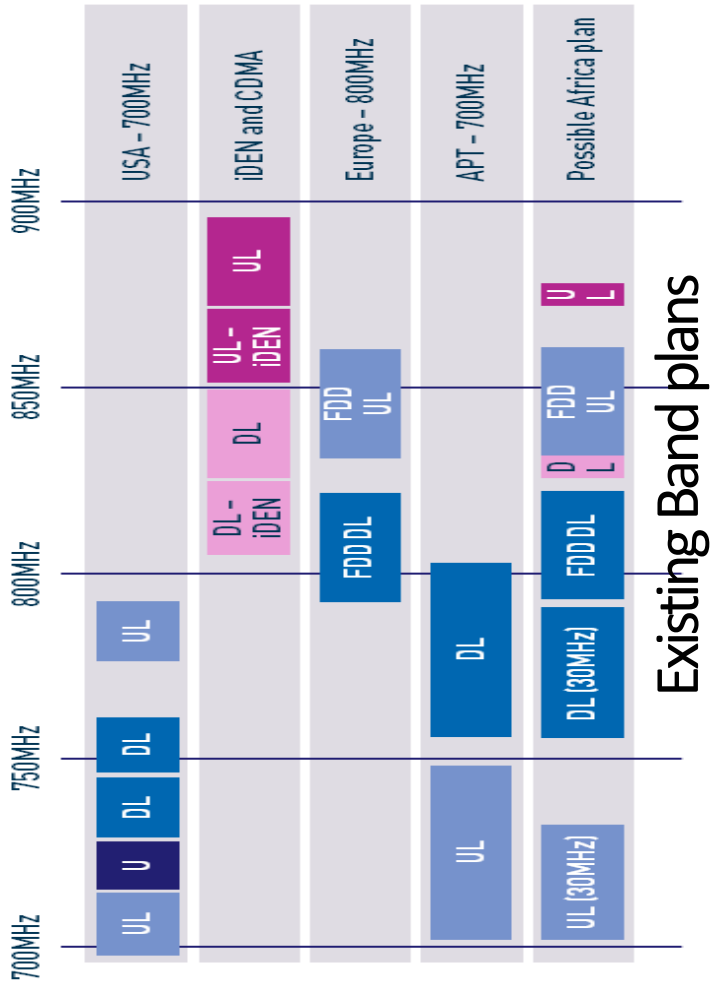


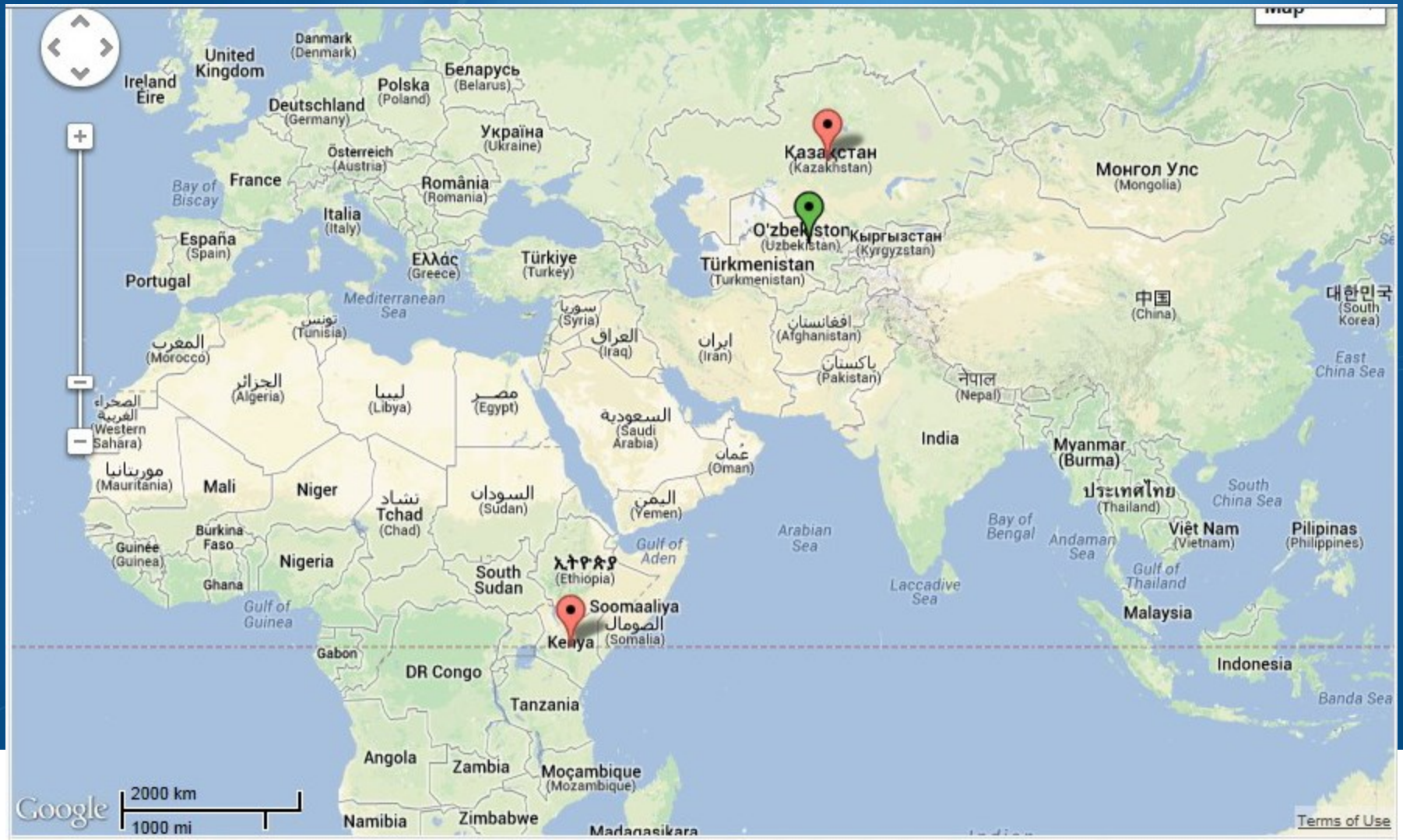
Figure 1: UAE 700 & 800 MHz channel plan (harmonized with APT lower duplexer and CEPT 800 MHz band)

- United Arab Emirates adopted the APT band plan in May 2013, but using only part of the band. Approved by **most ASMG members**.
- The UAE is adopting the 2 x 30 MHz channel plan for the 700 MHz band, consisting of 703–733 MHz (uplink) paired with 758 – 788 MHz (downlink).

- Considerable interest in APT band plan in Africa:
- Kenya and SA on trials



LTE 700 MHz in Region1. Source http://4g-map.info/



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aeronautical navigation services in the 700MHz and 800MHz bands

- ITU Radio Regulation No. 5.312 designates an **additional allocation for aeronautical radio navigation service** on a primary basis in **645–862MHz** in the following countries: Armenia, Azerbaijan, Belarus, Bulgaria, the Czech Republic, Georgia, Hungary, Kazakhstan, Kyrgyzstan, Moldova, Mongolia, Poland, Romania, the Russian Federation, Slovakia, Tajikistan, Turkmenistan, Ukraine and Uzbekistan. However, this allocation is **protected** only until **June 2015**.

- The CEPT has urged CEPT Administrations to take all practical steps to **clear the band 645–960MHz of assignments for aeronautical radio navigation services** and this is beginning to happen. Russia (July 2012), Romania (the fourth quarter of 2012),Slovakia (2012) already awarded licenses in the 800MHz band, and Poland (2015).

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Wireless in the 700 MHz

- **Program making and special events (PMSE)**
  - PMSE currently uses 700MHz spectrum in countries where this band is used for DTT. PMSE uses interleaved **spectrum (white space) throughout the DTT range, so** reducing availability of DTT spectrum would **cut the amount of spectrum available for PMSE**.
- **Public protection and disaster relief (PPDR)**
  - There are strong calls for more spectrum to be allocated to PPDR to help to modernize public safety. WRC-15 is expected to discuss the suitability of 700MHz spectrum for PPDR.
  - Agenda item AI1.3 of WRC-15.

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Benefits of Harmonization

- economies of scale,
  - Can decrease terminal costs by **50%** (also offer better performing phones, more choice)
  - Reduces the complexity of the radio design
- international roaming, Enables global roaming
- Interoperability,
  - Reduces interference with adjacent services and helps managing cross-border interference…

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Recommendations

- The broadcasting community to implement technological innovations, such as:
  - DVB-T2, latest compression technologies, and
  - single-frequency networks (SFNs)
- → increase spectrum efficiency and enable DTT platforms to provide
  - more high-definition (HD) services, which would make DTT services **more attractive** to consumers
  - and **use less spectrum**.
- Use TV frequencies < 694 MHz
- [illegible]

Ilham.ghazi@itu.int
www.itu.int

Any questions?

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