UHF spectrum – possibilities and constraints

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Current situation at UHF – pre WRC

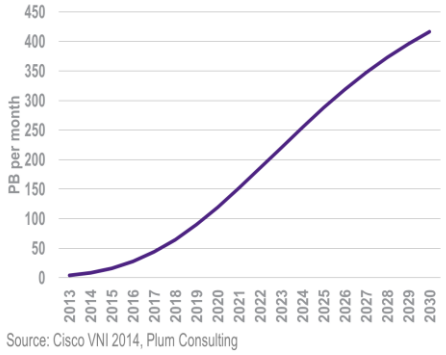
Still require spectrum to meet demand for terrestrial TV

Require additional harmonised spectrum to meet increasing demands for mobile broadband

Second set?
UHDTV
Public service

BROADCAST ⟷ MOBILE

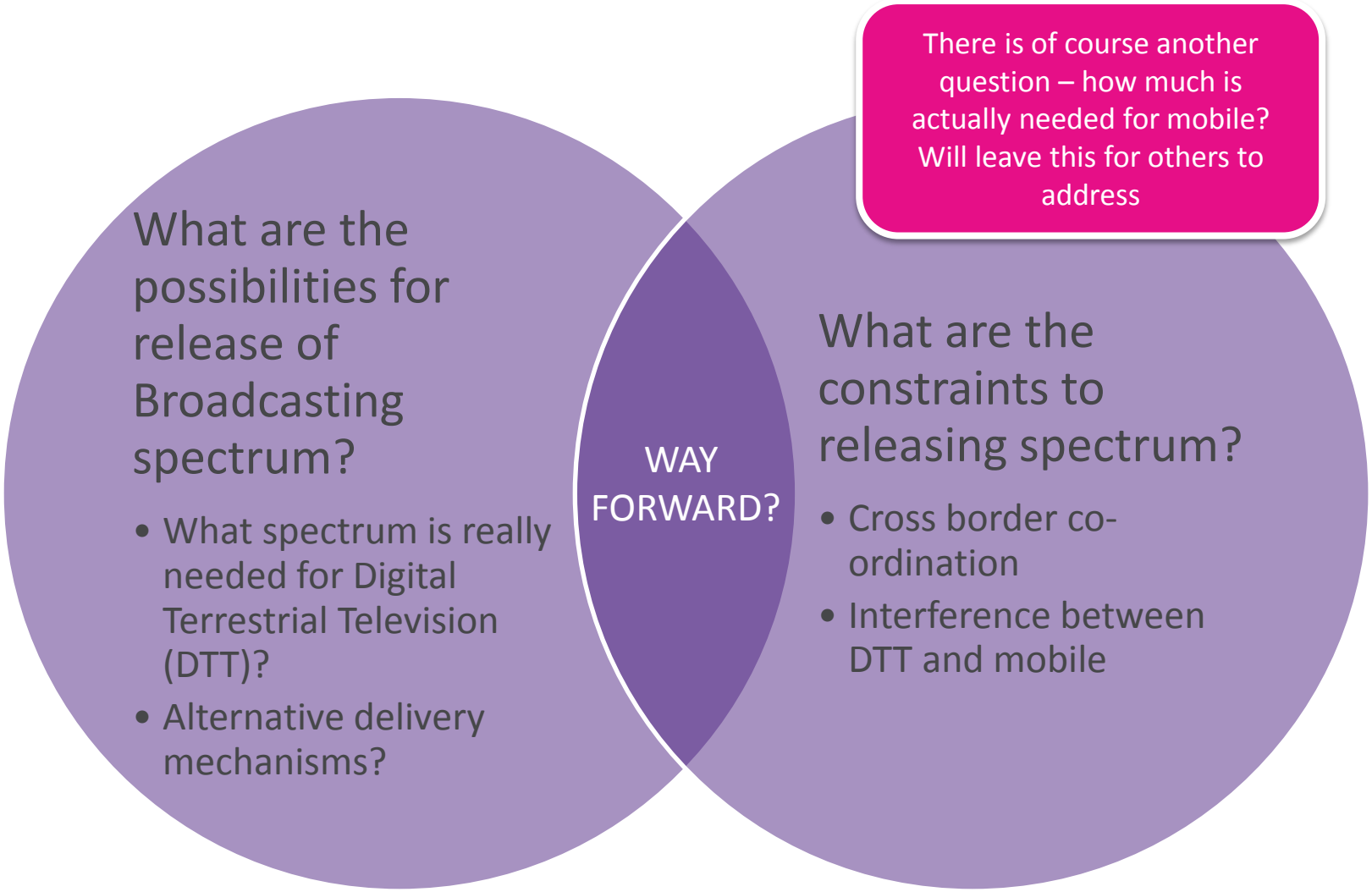
Traffic forecasts for Egypt



Source: Cisco VNI 2014, Plum Consulting

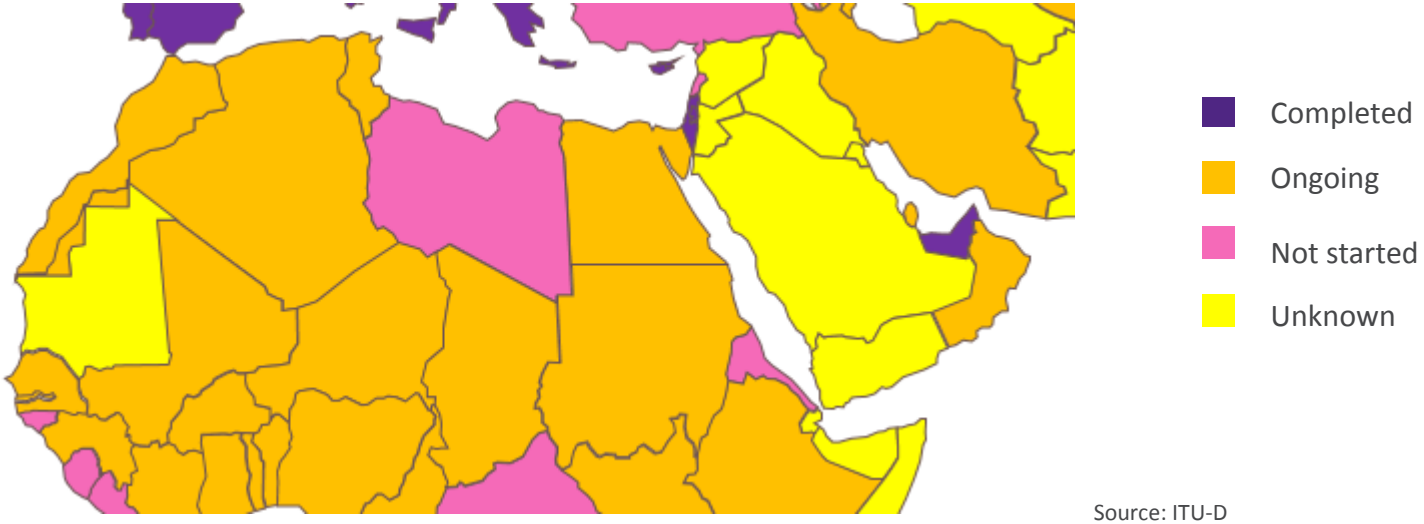
10% increase in broadband penetration increases GDP by 1.2%

Discussion for today



How much spectrum is realistically needed to support terrestrial TV?

- Simple answer is lots if switch-over is not implemented as analogue and digital TV both require access to spectrum …



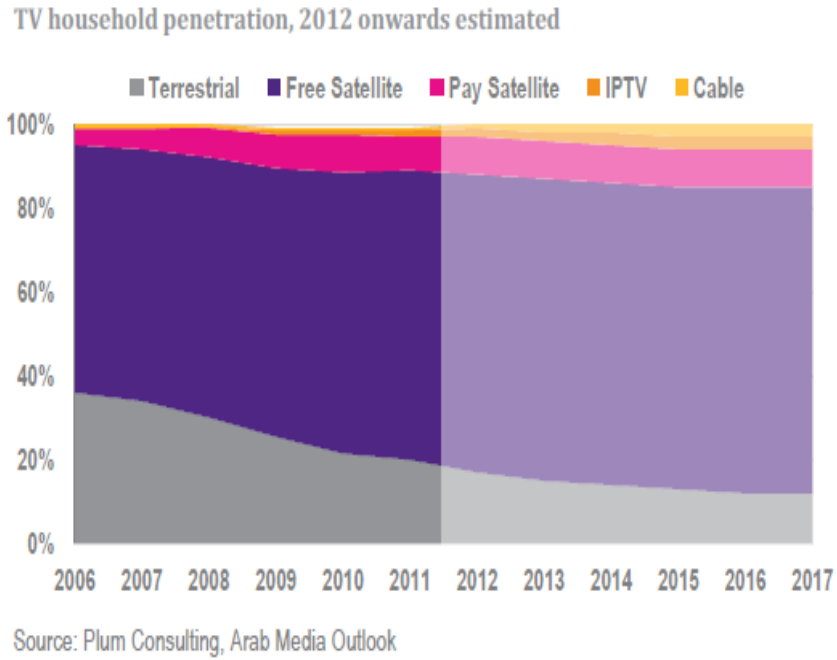
Source: ITU-D

- But analogue switch-off date was 17 June 2015 (2020 for some bands for some countries); no protection from interference for analogue TV after this date … implications for viewers

Countries need to implement switch-over to ensure continued terrestrial broadcasting

Broadcast platforms / technologies changing?

Now	Future
Terrestrial (Analogue & Digital)	**Terrestrial (Digital)**
Satellite	**Satellite**
Cable	**Cable**
IPTV	**IPTV**
Internet TV	**Internet TV**
Mobile (eMBMS on 4G)	**Mobile (4G & 5G)**
Wi-Fi	**Wi-Fi**



Overall size of broadcasting market continues to grow but number of households relying on terrestrial decreasing
% TV households equipped for satellite rose to 92% in 2013 (Eutelsat)

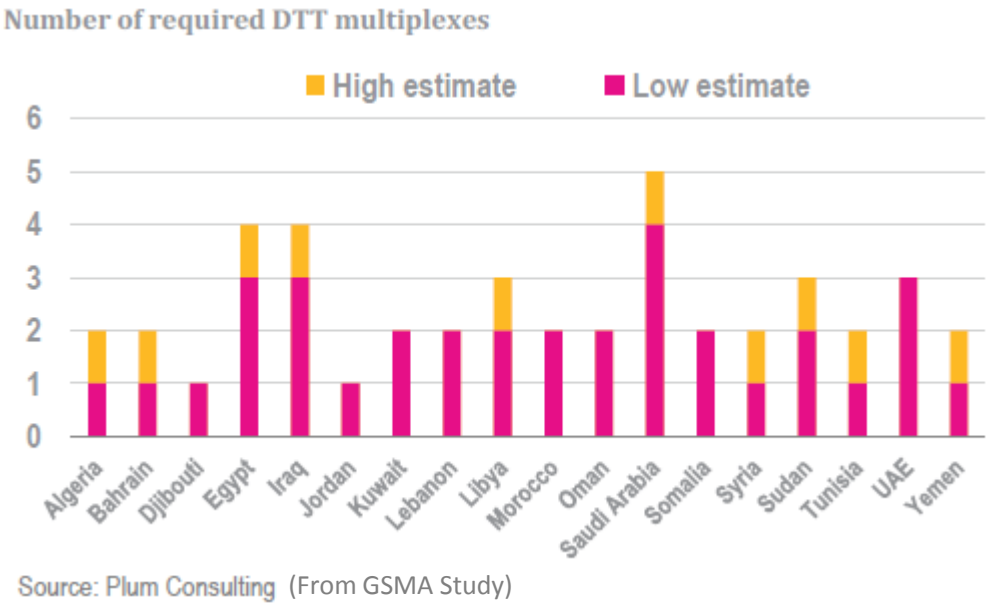
Move to low power low tower transmission to reinforce high power high tower networks

Possibility to use less spectrum with DTT

Analogue Terrestrial TV	Digital Terrestrial TV
MFN	SFN
Typically 4 -12 TV channels per country	8 MHz RF Channel = 1 Multiplex
	1 Multiplex supports 9 to 10 SD or 2 to 5 HD programmes

DTT has the potential to reduce spectrum requirements but countries need to be realistic in how many Multiplexes will be required

Estimated number of multiplexes per country



Source: Plum Consulting (From GSMA Study)

Assumes will replace analogue transmissions with digital and not all programmes will be in HD. Allows for national and regional programmes as currently (reasonable assumption with increasing availability of alternative platforms)

Significant change in DTT requirements:

- RRC-06: 7 nationwide frequencies in UHF Bands IV & V and one in VHF Band III
- 4 DTT multiplexes in UHF band assumed for recent re-planning
- Now … typically 2 to 3 multiplexes in both VHF and UHF?

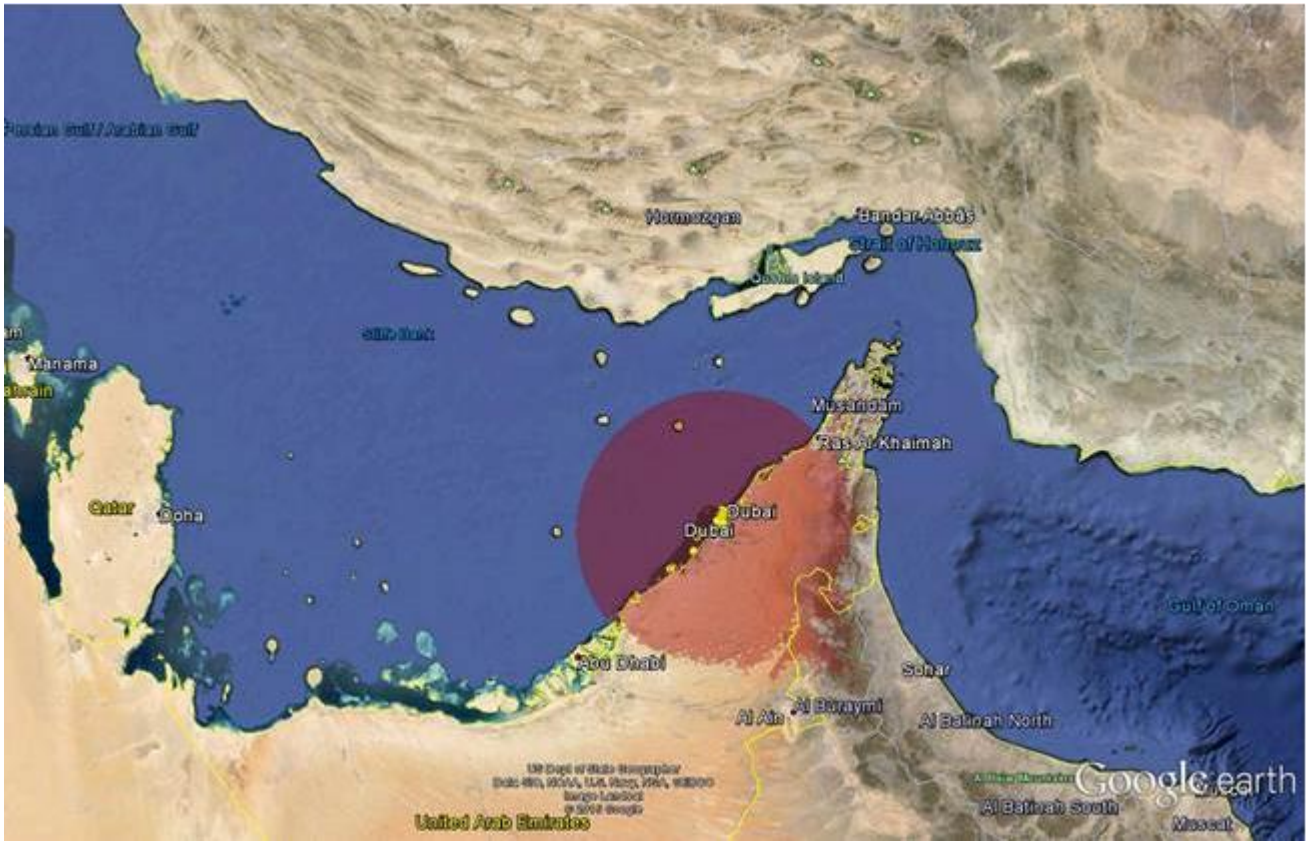
Implications for spectrum for DTT

- Ideal situation can use same frequencies in each country so for 3 multiplexes only require 3 x 8 MHz of spectrum

- Not that easy as propagation of radio waves means use of 8 MHz channel in one country may interfere with reception in another country

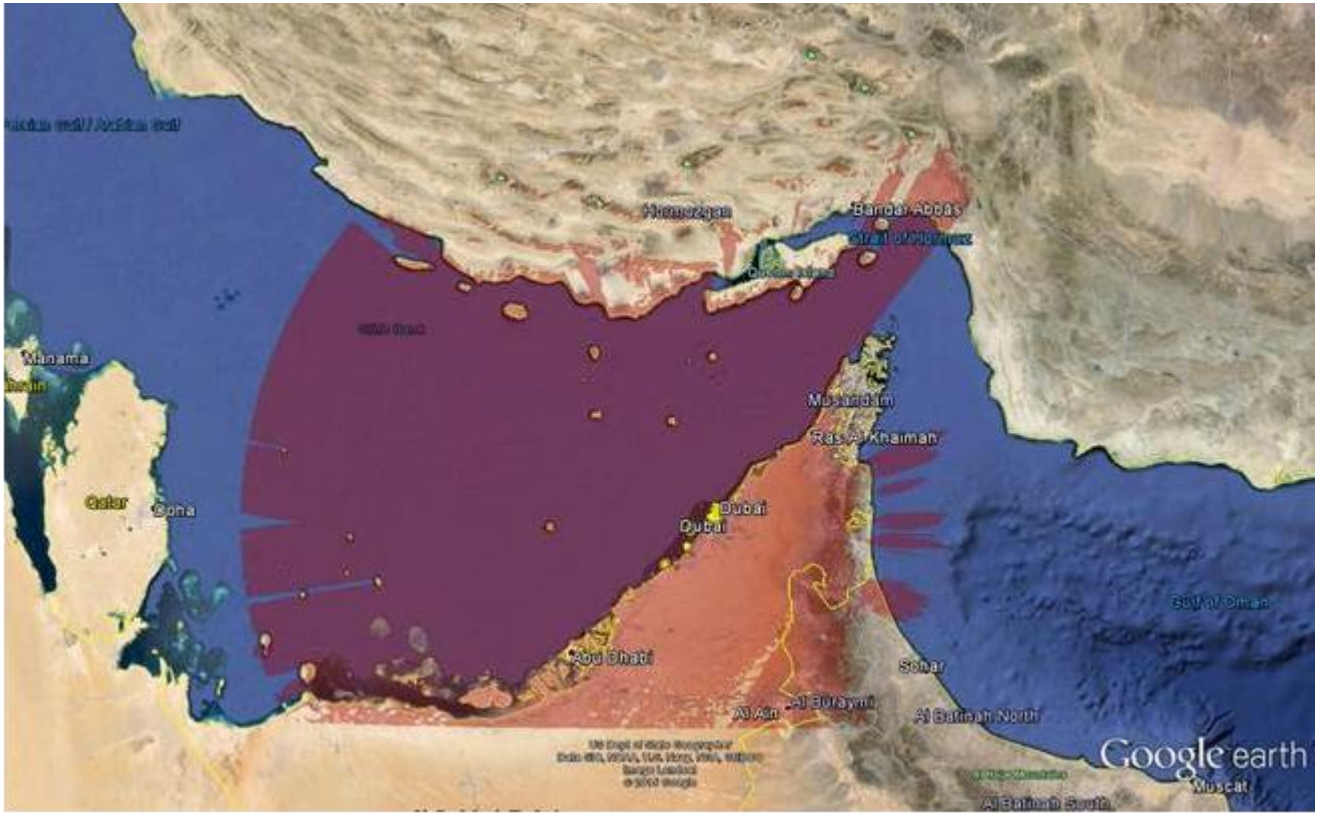
Practical implications of cross border interference

- A 5kW transmitter to serve Dubai looks easy enough…



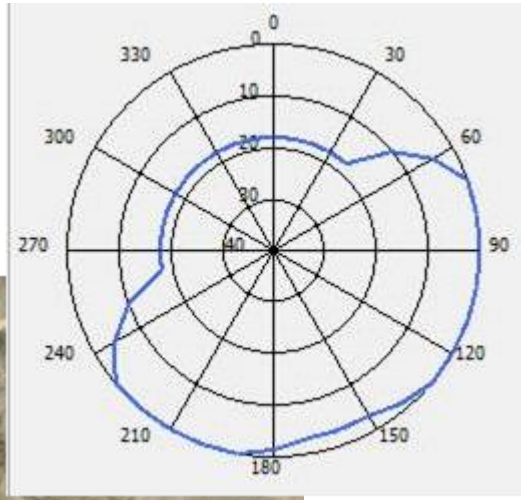
Practical implications of cross border interference

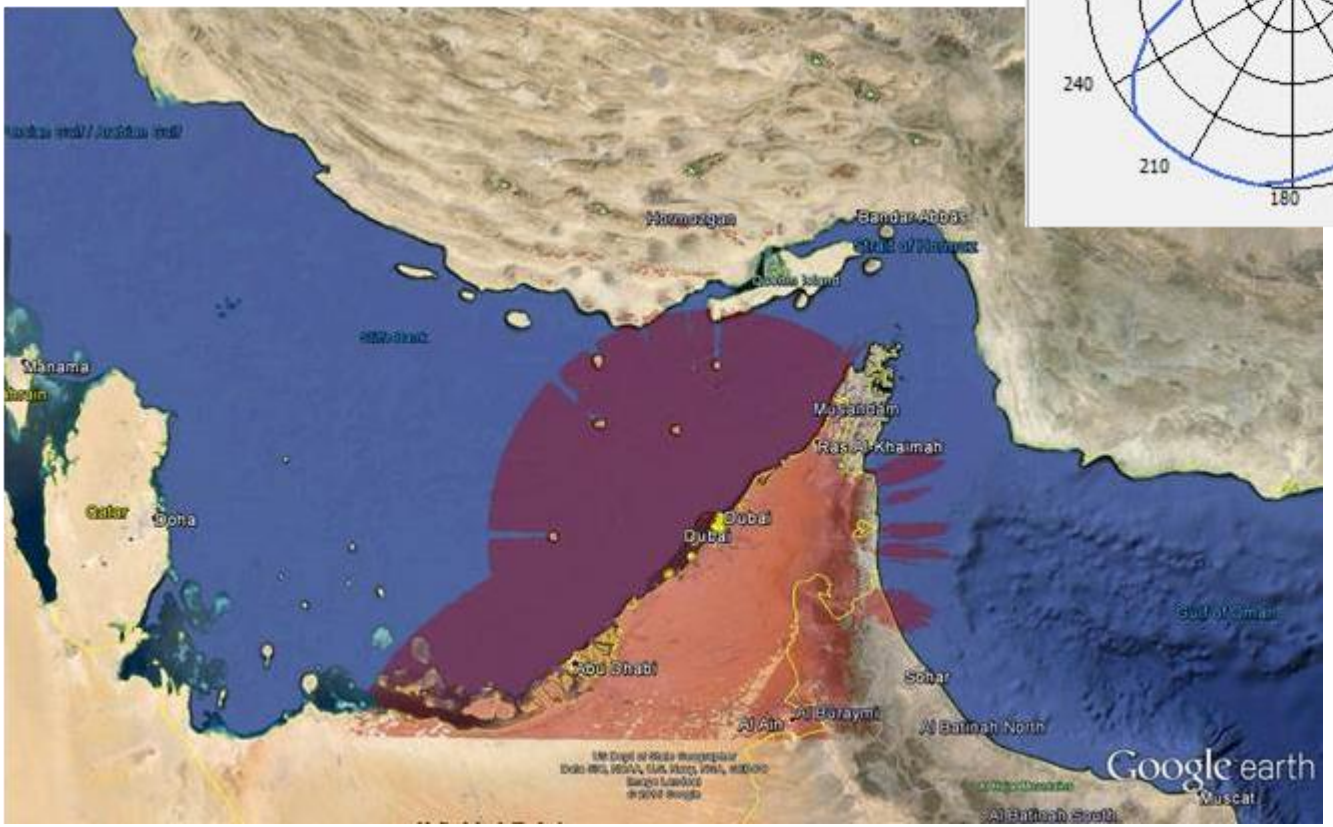
- But that's at 50% time. We need to protect services at 1% time, which gives much larger contours.
- With the same 5kW transmitter, but at 1% time:



Practical implications of cross border interference

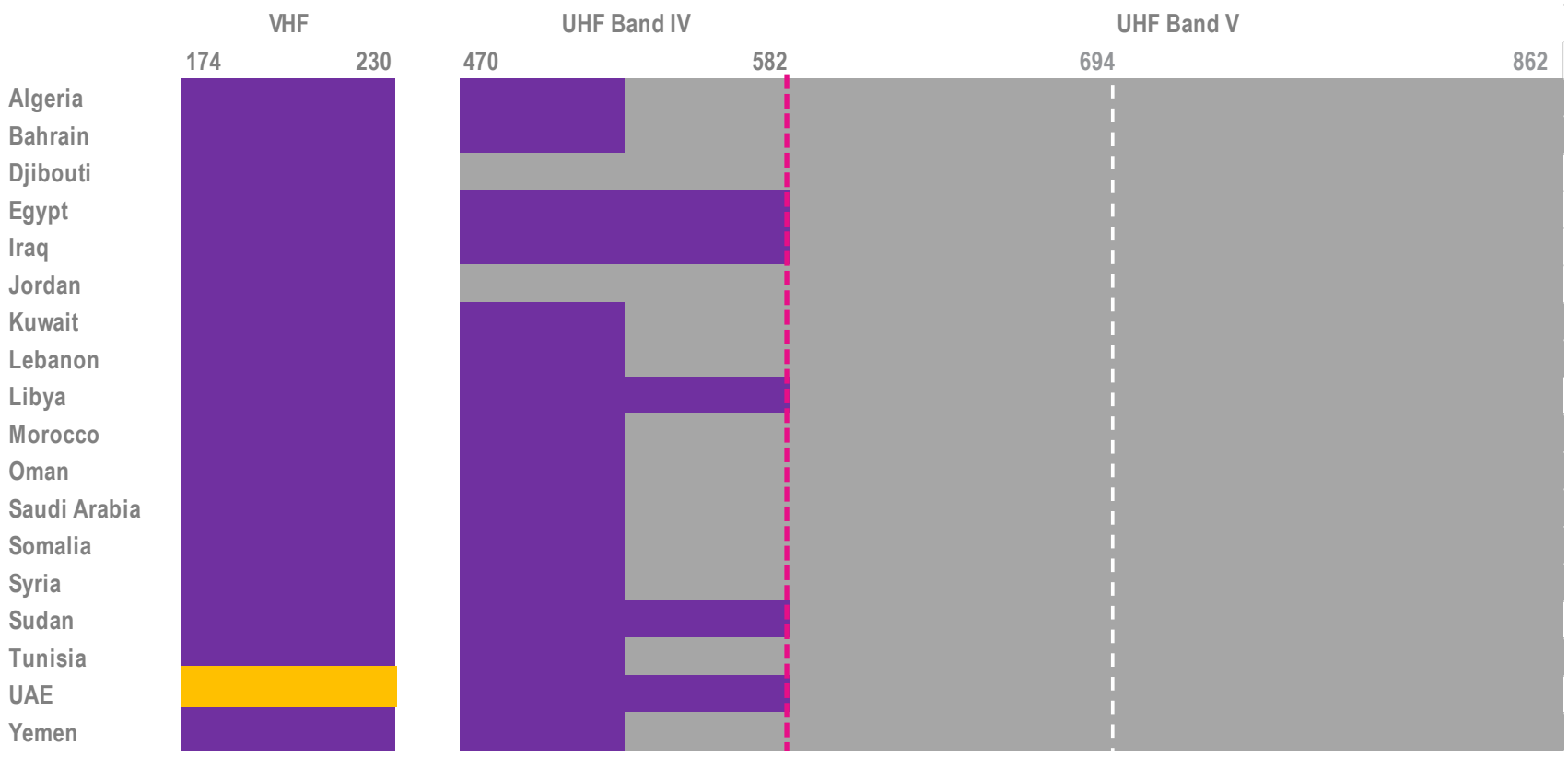
- …but if we shape the radiation pattern we may get away with it…





Possible outcome

- Assumes countries divided into 7 separate groupings determined to avoid potential for cross border interference



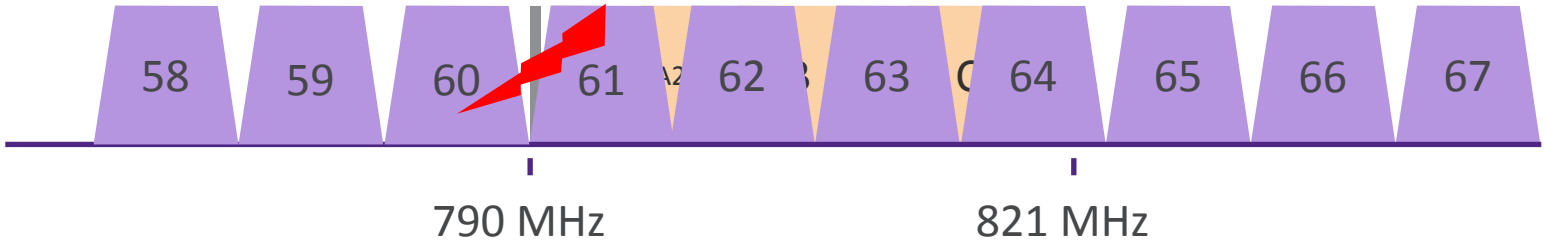
Source: Plum Consulting (From GSMA Study)

Conclusions from GSMA Study

- Study can be found at http://www.plumconsulting.co.uk/pdfs/Plum_Aug_2015_GSMA_Terrestrial_broadcasting_and_spectrum_use_in_the_Arab_states.pdf or http://www.gsma.com/spectrum/terrestrial-broadcasting-and-spectrum-use-in-the-arab-states/
- Some of the conclusions from this report are worth summarising:
  - Current assumption of 4 multiplexes may lead to sub-optimal outcomes
  - Potential to release spectrum above 582 MHz for other services
  - Co-primary mobile and broadcast allocation in 470 – 694 MHz provides future flexibility

A brave new world at 800 MHz: a quick update

- The upper part of the UHF broadcast band has been re-farmed for use by 4G cellular (LTE) services in the UK



- Two 10 MHz blocks (Vodafone & Telefonica), two 5 MHz blocks ('3' and EE)
- Guard band of 1 MHz
- Interference might reasonably be expected…significant concerns been voiced

… and the outcome to date

- Experience in UK to date demonstrates less of an issue than first thought:
  - Initially research indicated 2.3 million households could be impacted and of these 900,000 would rely on DTT
  - To prepare for the expected chaos, a series of pilot trials were organised in 2013 but very few instances of interference found
  - After pilot trials estimated 90,000 households
  - After mobile network roll-out even lower numbers experienced (8,000 -15,000)

Remember *"challenge in spectrum management .. is to make decisions that allow for the future to surprise us as it always does" (Steve Song)*

Thank you