Spectrum roadmaps

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Nairobi, Kenya

Spectrum Roadmap: Why It Matters

A spectrum roadmap is essential to ensure there is enough spectrum to meet surging demand for mobile services

- Increasing pace of mobile technology evolution and the decreasing cycle time for new technology demand requires increased agility in spectrum management and planning framework

- Balance the time need for incumbents to relocate against the costs of delaying the introduction of new technologies – trade-offs

- Allocate spectrum for new uses in advance of the technology becoming available so that operators have time for planning, capital expenditure and implementation

A spectrum roadmap helps

- Government forecast future trends and manage its work and risks; and
- Industry with increased certainty about the government's future allocation plans and management of radio spectrum

Key Themes

Key themes for a spectrum roadmap

- Emerging challenges and opportunities to radio spectrum management framework and approach, at least 3 – 5 years into the future

- Identify future technological trends and drivers, and assess their impact on spectrum policy and planning

- Spectrum management work projects and programme planned to address the identified challenges and opportunities

- A roadmap is an evolving document, to be reviewed and updated regularly (annual review is recommended)

Key Challenges

Some key challenges to address

- What spectrum will be available and when:
  - To plan what spectrum operators need to invest in over the near-to-long term to meet rapidly growing data demand (this should encompass coverage & capacity bands, existing and future bands)
- Regulatory certainty:
  - e.g. allocation methodologies, renewal procedure, projects and programme
- Licensing regime:
  - e.g. refarming, resource pricing, spectrum sharing
- Harmonised future spectrum:
  - To reduce equipment costs, limit interference and enable roaming

Roadmap example: The European Union

EU bodies are active in promoting a common roadmap for spectrum release across Europe

4G Spectrum Roadmap

- In 2012, European Parliament adopted "Radio Spectrum Policy Programme" (RSPP):
  - 900, 1800 and 2600 MHz to be allocated for high speed electronic communication services by end-2012
  - 800 MHz band tobe reallocated for high speed electronic communication services by 1 January, 2013
  - At least 1200 MHz of spectrum to be identified for wireless data

EU monitors member state performance Although only 12 of 28 met original deadline, almost all were compliant by end-2013

5G Developments

- In 2016, the RSPG released plans to harmonise availability of spectrum for 5G services:
  - 3400-3800 MHz identified as primary band for the introduction of 5G
  - 700 MHz band, already harmonised in Europe, identified as 5G coverage band
  - Availability of Millimeter wave spectrum under discussion

The EU 5G roadmap is still in its infancy but already there is an emerging consensus around the relevant bands
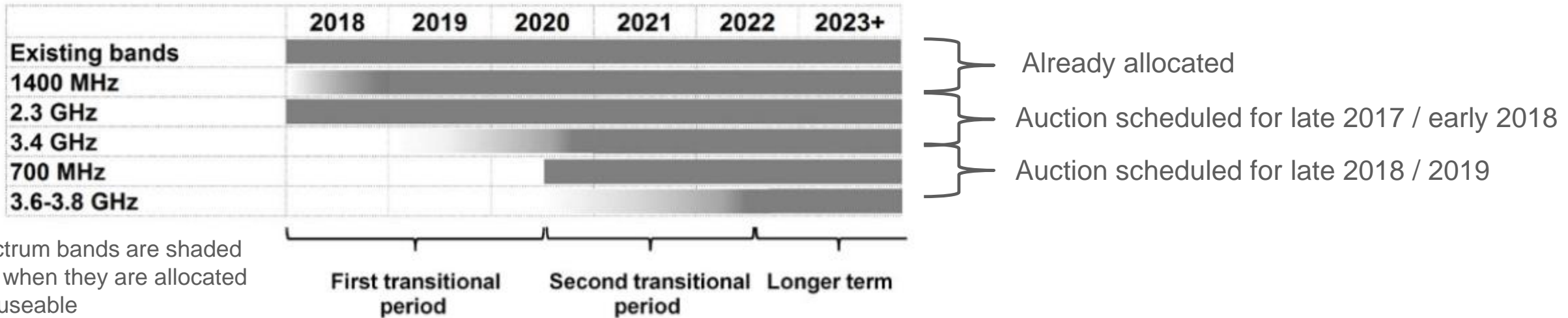
Roadmap example: UK plans for 4G and 5G spectrum

- Ofcom regularly releases information on its website and runs consultations concerning the release of new spectrum
- For example:
  - as part of the consultation process for the upcoming 2.3 & 3.4 GHZ Award, Ofcom released a timeline for availability of mobile spectrum in the 700 MHz and 3.6-3.8 GHz bands
  - in 2017, it consulted on clearing the 3.6 GHz band and has issued notices to fixed link operators to clear the band within 5 years

UK Mobile Spectrum Roadmap

Spectrum bands are shaded grey when they are allocated and useable

Source: Ofcom, Statement: Award of 2.3 and 3.4 GHz spectrum bands: Competition issues and auction regulations, 11 July 2017.

Roadmap examples: Australia and New Zealand

- **Australia**
  - A Five-year Spectrum Outlook was published annually;
  - Outline the ACMA's assessment of the demand for different parts of the radio spectrum;
  - Reviewed annually, in particular its spectrum work programme;
  - http://www.acma.gov.au/Industry/Spectrum/Spectrum-projects/5-Year-Spectrum-Outlook
- **New Zealand**
  - Released its Radio Spectrum Five Year Outlook 2012-2016 in 2013;
  - An update is being planned;
  - Stimulated the discussion about the uses of radio spectrum;
  - To update and refine the radio spectrum management framework to make it more responsive and effective;
  - http://www.rsm.govt.nz/online-services-resources/publications/annual-reports-and-business-plans/outlook-2012-2016
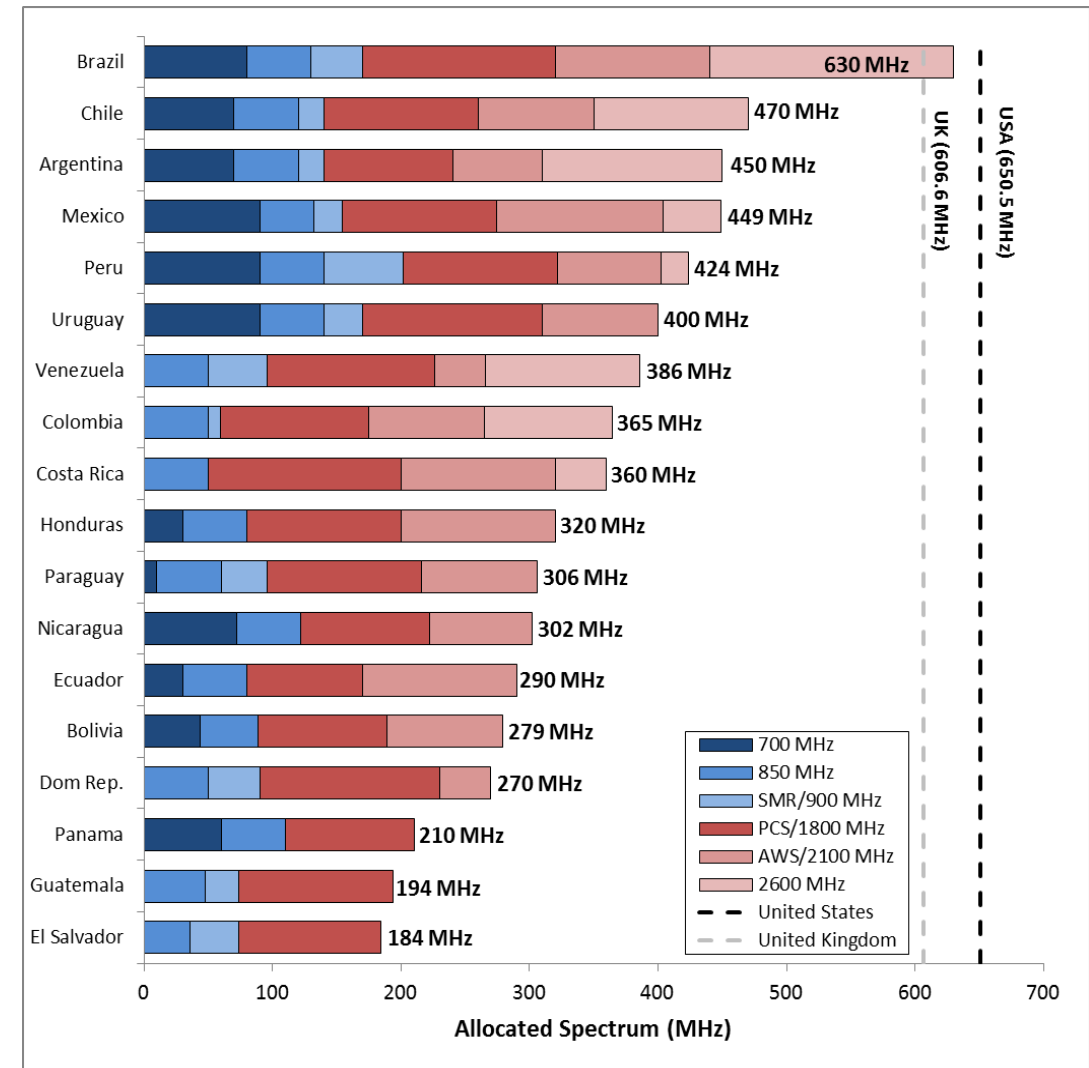
What happens without a roadmap?

- A new report by GSMA:
  - identifies failure to award spectrum in timely manner as key factor holding back 4G development in Latin America
  - Highlights slow pace in allocating 700 MHz and 2.6 GHz
- Many of these countries lack spectrum roadmaps

Guatemala: from spectrum leader to laggard

- In early 2000s, Guatemala was a regional leader in market-based spectrum management
- Reports by World Bank and academic papers highlighted its success:
  - Early release of spectrum for mobile using auctions
  - By 2004, ranked 2nd out of 16 Latin American countries in mobile penetration
  - Average retail prices approximately halfe of peer countries
- But Guatemala lacked a roadmap for future spectrum release:
  - It has not allocated additional mobile spectrum in the last 15 years (now ranks 17 of 18 in spectrum availability)
  - In 2015, a process to allocate additional spectrum was discussed but this is delayed owing to legal & regulatory issues
  - Market performance has correspondingly declined (ranks 11 of 17 in NERA/GSMA "wireless score")

Lack of roadmaps has contributed to Latin American countries lagging North America and Europe in spectrum release

UK (606.6 MHz)   USA (650.5 MHz)

Country	Allocated Spectrum (MHz)
Brazil	630 MHz
Chile	470 MHz
Argentina	450 MHz
Mexico	449 MHz
Peru	424 MHz
Uruguay	400 MHz
Venezuela	386 MHz
Colombia	365 MHz
Costa Rica	360 MHz
Honduras	320 MHz
Paraguay	306 MHz
Nicaragua	302 MHz
Ecuador	290 MHz
Bolivia	279 MHz
Dom Rep.	270 MHz
Panama	210 MHz
Guatemala	194 MHz
El Salvador	184 MHz

Legend:
- 700 MHz
- 850 MHz
- SMR/900 MHz
- PCS/1800 MHz
- AWS/2100 MHz
- 2600 MHz
- United States
- United Kingdom

Allocated Spectrum (MHz)

What would the spectrum roadmap for Kenya look like ?

- **Issues for discussion:**
    - Emerging challenges and opportunities to radio spectrum management framework and approach in the future for Kenya?
    - Identify future technological trends and drivers in Kenya, and assess their impact on spectrum policy and planning
    - Spectrum management work projects and programme planned to address the identified challenges and opportunities
    - What spectrum will be available and when?
    - Regulatory certainty (allocation methodologies, renewal procedure, projects and programme)
    - Licensing regime (re-farming, resource pricing, spectrum sharing)
    - Options for harmonised future spectrum

Kenya roadmap?

MHz released for mobile

Kenya today — 270 MHz

Europe 2010 — 340 MHz

Europe 2015 — 590 MHz

Europe 2020+ — 1,100 MHz

How and when will Kenya get from here to here?

600	700	800	900	1400	1800	2100	2300	2600	3400-3800
70	60+	60	70	40+	150	120	40+	190	400

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