Spectrum requirements across the Sub-Sahara region

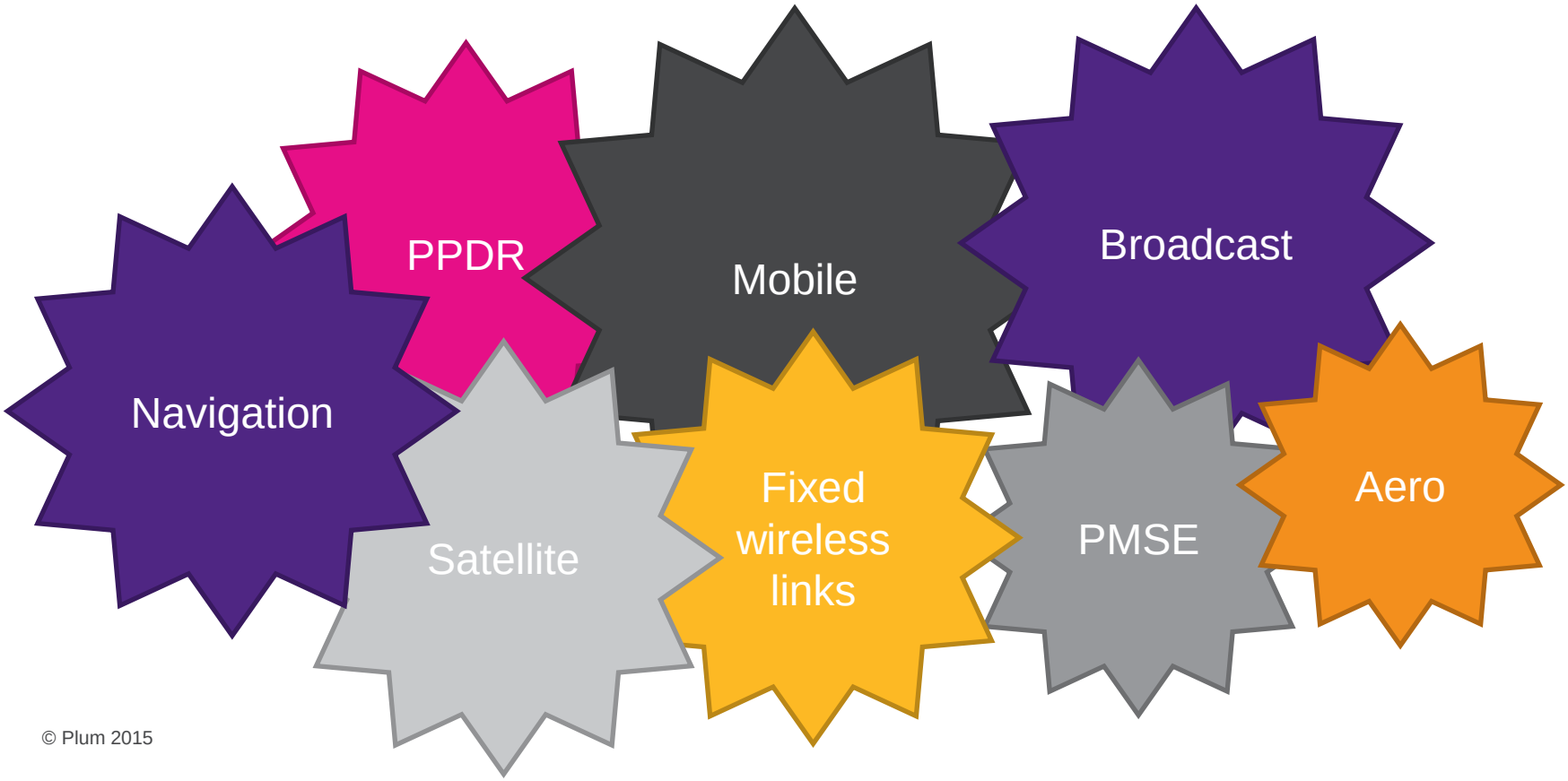
Tony Lavender

The 2015 Sub-Sahara Spectrum Management Conference

19 February 2015

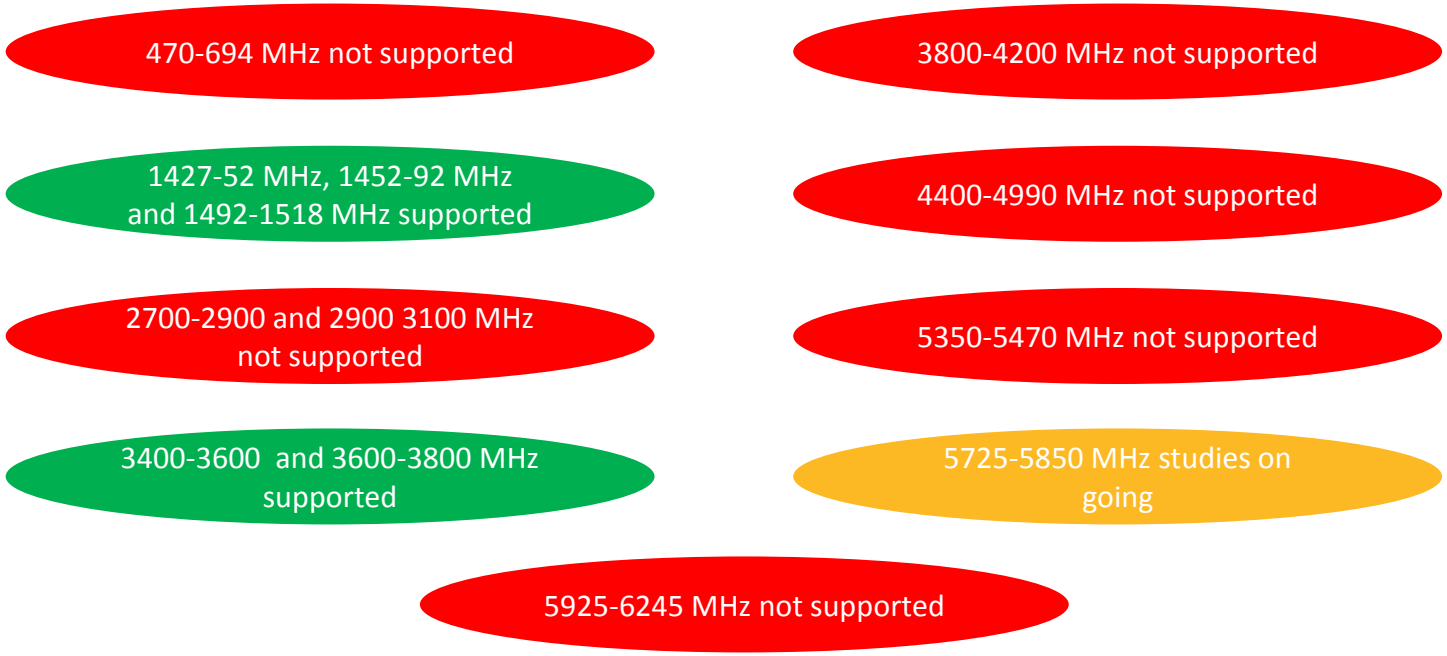
Always a need for more spectrum

- Spectrum is required for an expanding multitude of uses/applications
- Many users believe they will require more spectrum
- Spectrum is a finite resource and there is only a limited amount spectrum especially where everyone wants to be



WRC15 – mobile broadband

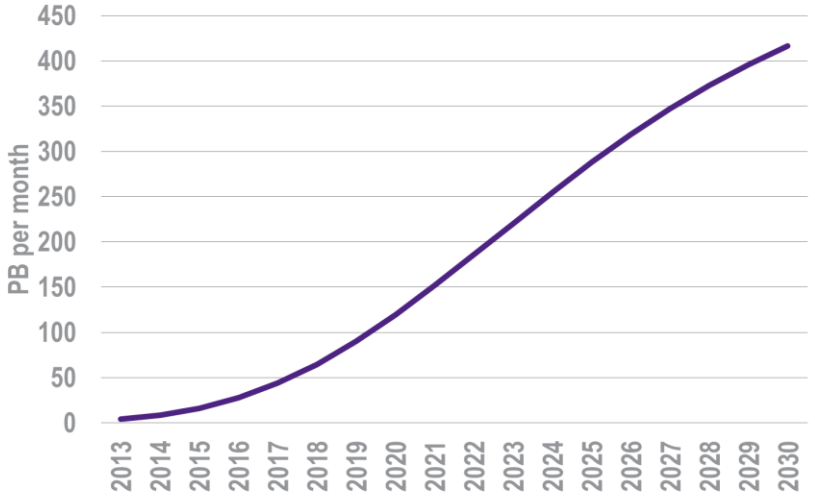
- There are several proposals for bands under Agenda Item 1.1 but not all of it will happen – below are CEPT positions following PTD



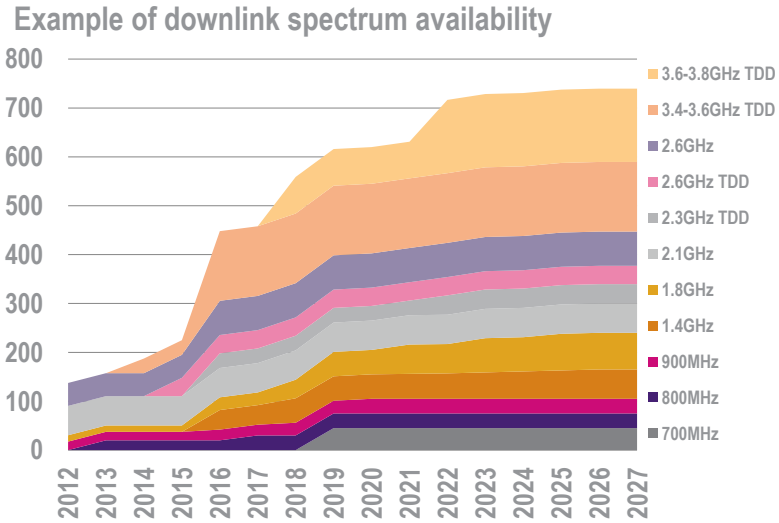
- For mobile broadband harmonisation is essential to drive efficiencies
- It's also necessary at a practical level to think of device limitations with an increasing number of bands

The mobile capacity crunch

- Increases in mobile data traffic require more spectrum but how much?
- Several factors come into play
  - Increase the amount of spectrum available
  - Technology improvements resulting in increased spectral efficiency
  - Improved reuse of spectrum to increase capacity and use of small cells to target capacity hot spots
- Two big questions
  - When does the crunch occur?
  - What role does spectrum sharing play?

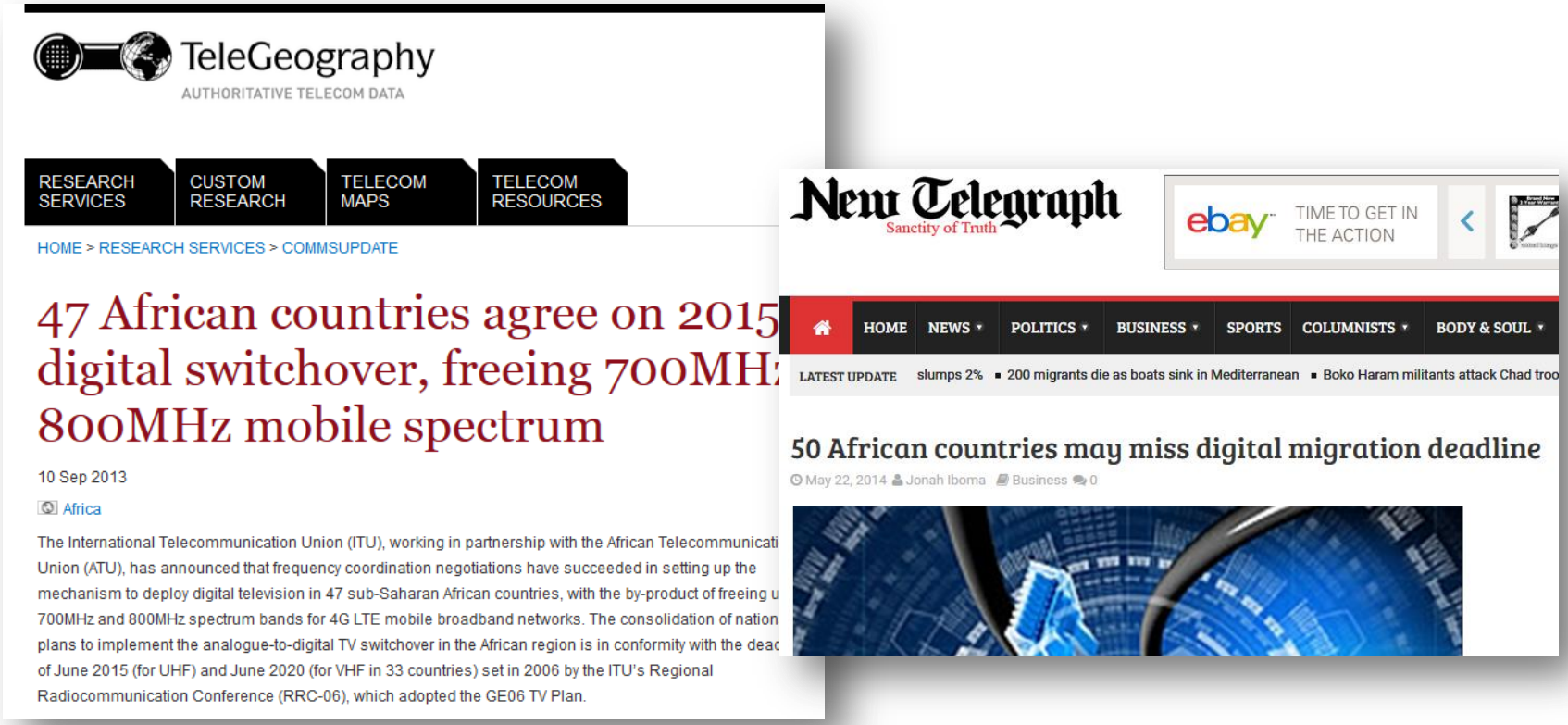


Source: Cisco VNI 2014, Plum Consulting



Digital switchover

- Analogue broadcasting is inefficient
- Digital switchover presents a huge opportunity – more channels, more engagement, interaction, pay TV over terrestrial, encryption
- Logistic challenges can be overcome …



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47 African countries agree on 2015 digital switchover, freeing 700MHz 800MHz mobile spectrum

10 Sep 2013

Africa

The International Telecommunication Union (ITU), working in partnership with the African Telecommunicati Union (ATU), has announced that frequency coordination negotiations have succeeded in setting up the mechanism to deploy digital television in 47 sub-Saharan African countries, with the by-product of freeing u 700MHz and 800MHz spectrum bands for 4G LTE mobile broadband networks. The consolidation of nation plans to implement the analogue-to-digital TV switchover in the African region is in conformity with the deac of June 2015 (for UHF) and June 2020 (for VHF in 33 countries) set in 2006 by the ITU's Regional Radiocommunication Conference (RRC-06), which adopted the GE06 TV Plan.

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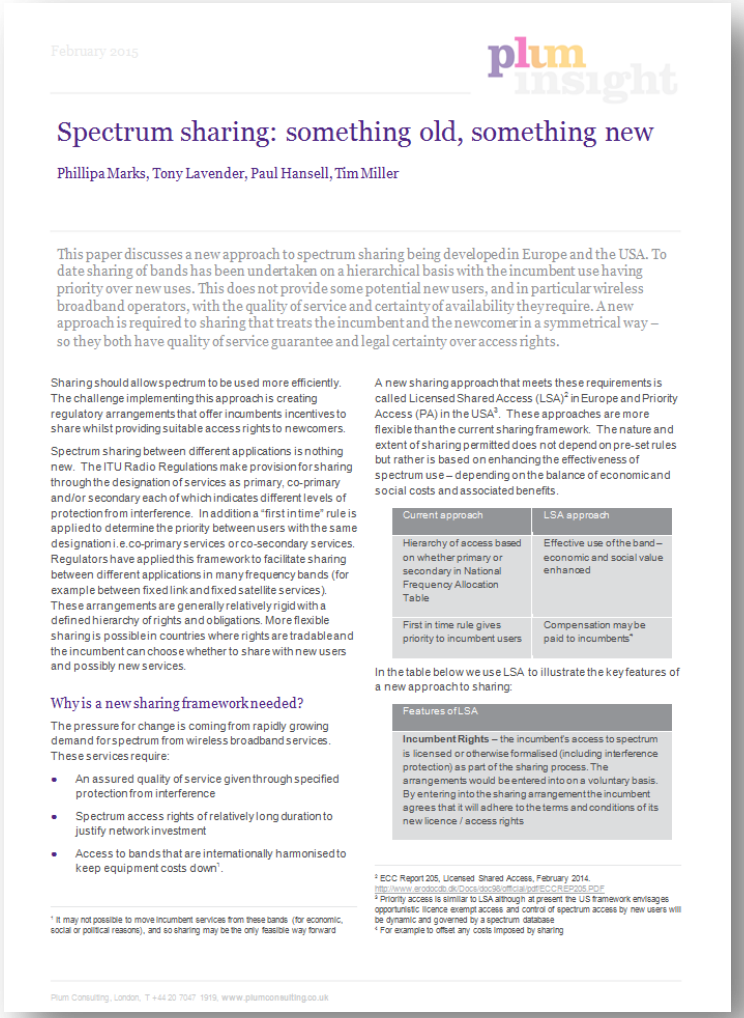
50 African countries may miss digital migration deadline

May 22, 2014 Jonah Iboma Business 0

Spectrum sharing

- Sharing is not a new thing
  - Low-powered sharing in licence exempt bands
  - PMSE sharing with broadcast
- Sharing nearly always poses problems with certainty for the incumbent and for the new user
- Licensed Shared Access (LSA) has the potential to make spectrum use much more efficient
- Dynamic sharing can go even further – but technology is still developing
  - White space databases
  - Sensing and monitoring



February 2015

plum insight

Spectrum sharing: something old, something new

Phillipa Marks, Tony Lavender, Paul Hansell, Tim Miller

This paper discusses a new approach to spectrum sharing being developed in Europe and the USA. To date sharing of bands has been undertaken on a hierarchical basis with the incumbent use having priority over new uses. This does not provide some potential new users, and in particular wireless broadband operators, with the quality of service and certainty of availability they require. A new approach is required to sharing that treats the incumbent and the newcomer in a symmetrical way – so they both have quality of service guarantee and legal certainty over access rights.

Sharing should allow spectrum to be used more efficiently. The challenge implementing this approach is creating regulatory arrangements that offer incumbents incentives to share whilst providing suitable access rights to newcomers.

Spectrum sharing between different applications is nothing new. The ITU Radio Regulations make provision for sharing through the designation of services as primary, co-primary and/or secondary each of which indicates different levels of protection from interference. In addition a "first in time" rule is applied to determine the priority between users with the same designation i.e. co-primary services or co-secondary services. Regulators have applied this framework to facilitate sharing between different applications in many frequency bands (for example between fixed link and fixed satellite services). These arrangements are generally relatively rigid with a defined hierarchy of rights and obligations. More flexible sharing is possible in countries where rights are tradable and the incumbent can choose whether to share with new users and possibly new services.

Why is a new sharing framework needed?

The pressure for change is coming from rapidly growing demand for spectrum from wireless broadband services. These services require:

- An assured quality of service given through specified protection from interference
- Spectrum access rights of relatively long duration to justify network investment
- Access to bands that are internationally harmonised to keep equipment costs down[4].

[1] It may not possible to move incumbent services from these bands (for economic, social or political reasons), and so sharing may be the only feasible way forward

A new sharing approach that meets these requirements is called Licensed Shared Access (LSA)[2] in Europe and Priority Access (PA) in the USA[3]. These approaches are more flexible than the current sharing framework. The nature and extent of sharing permitted does not depend on pre-set rules but rather is based on enhancing the effectiveness of spectrum use – depending on the balance of economic and social costs and associated benefits.

Current approach	LSA approach
Hierarchy of access based on whether primary or secondary in National Frequency Allocation Table	Effective use of the band – economic and social value enhanced
First in time rule gives priority to incumbent users	Compensation may be paid to incumbents*

In the table below we use LSA to illustrate the key features of a new approach to sharing:

Features of LSA
Incumbent Rights – the incumbent's access to spectrum is licensed or otherwise formalised (including interference protection) as part of the sharing process. The arrangements would be entered into on a voluntary basis. By entering into the sharing arrangement the incumbent agrees that it will adhere to the terms and conditions of its new licence / access rights

[2] ECC Report 205, Licensed Shared Access, February 2014. http://www.erodocdb.dk/Docs/doc98/official/pdf/ECCREP205.PDF
[3] Priority access is similar to LSA although at present the US framework envisages opportunistic licence exempt access and control of spectrum access by new users will be dynamic and governed by a spectrum database
[4] For example to offset any costs imposed by sharing

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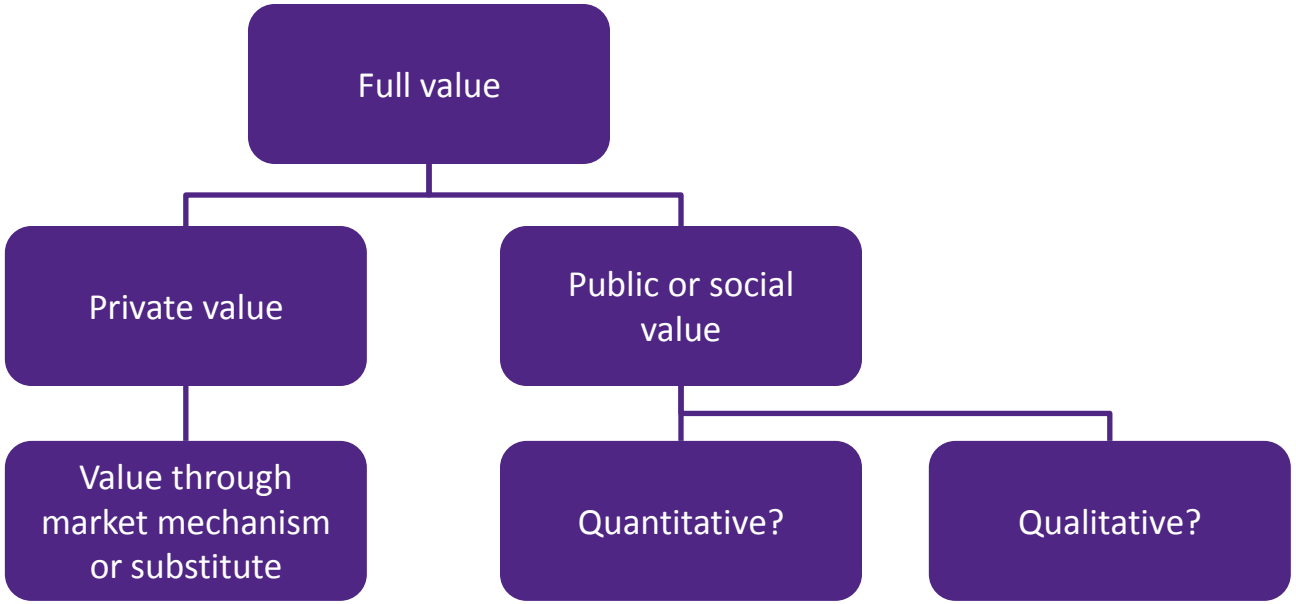
Spectrum assignment decisions



What does the market mechanism actually reveal?

- Assignment decisions generally relate to change of use – dealing with an increment of spectrum
- Much focuses on the private value to licensees of spectrum but this analysis can overlook things
  - Other primary/secondary uses
  - Social value of the services delivered through use of the spectrum
- Handling State owned spectrum is often complex

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