



NEW APPROACHES TO SPECTRUM MANAGEMENT

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Uses evolve...and so does infrastructure



<https://aulaeninternet.wikispaces.com/La+v%C3%ADa+Herc%C3%BAlea>
http://ccaa.elpais.com/ccaa/2012/10/08/catalunya/1349700000_877413.html



But transition can sometimes be complex

UNITED STATES FREQUENCY ALLOCATIONS THE RADIO SPECTRUM

RADIO SERVICES COLOR LEGEND

■ AERONAUTICAL MOBILE	■ INTER SATELLITE	■ RADIO AERONAUTIC
■ AERONAUTICAL MOBILE SATELLITE	■ LAND MOBILE	■ RADIO DETERMINATION
■ AERONAUTICAL RADIO NAVIGATION	■ LAND MOBILE SATELLITE	■ RADIO LOCATION
■ AIRTELE	■ MARITIME MOBILE	■ RADIO LOCATION SATELLITE
■ AIRTELE SATELLITE	■ MARITIME MOBILE SATELLITE	■ RADIO NAVIGATION
■ BROADCASTING	■ MARITIME RADIO NAVIGATION	■ RADIO NAVIGATION SATELLITE
■ BROADCASTING SATELLITE	■ METEOROLOGICAL AIDS	■ SPACE OPERATION
■ EXPLORATION SATELLITE	■ METEOROLOGICAL	■ SPACE RESEARCH
■ FIXED	■ MOBILE	■ STANDARD FREQUENCY AND TIME SIGNAL
■ FIXED SATELLITE	■ MOBILE SATELLITE	■ STANDARD FREQUENCY AND TIME SIGNAL SATELLITE

ACTIVITY CODE

■ GOVERNMENT EXCLUSIVE	■ GOVERNMENT / NON-GOVERNMENT SHARED
■ NON-GOVERNMENT EXCLUSIVE	

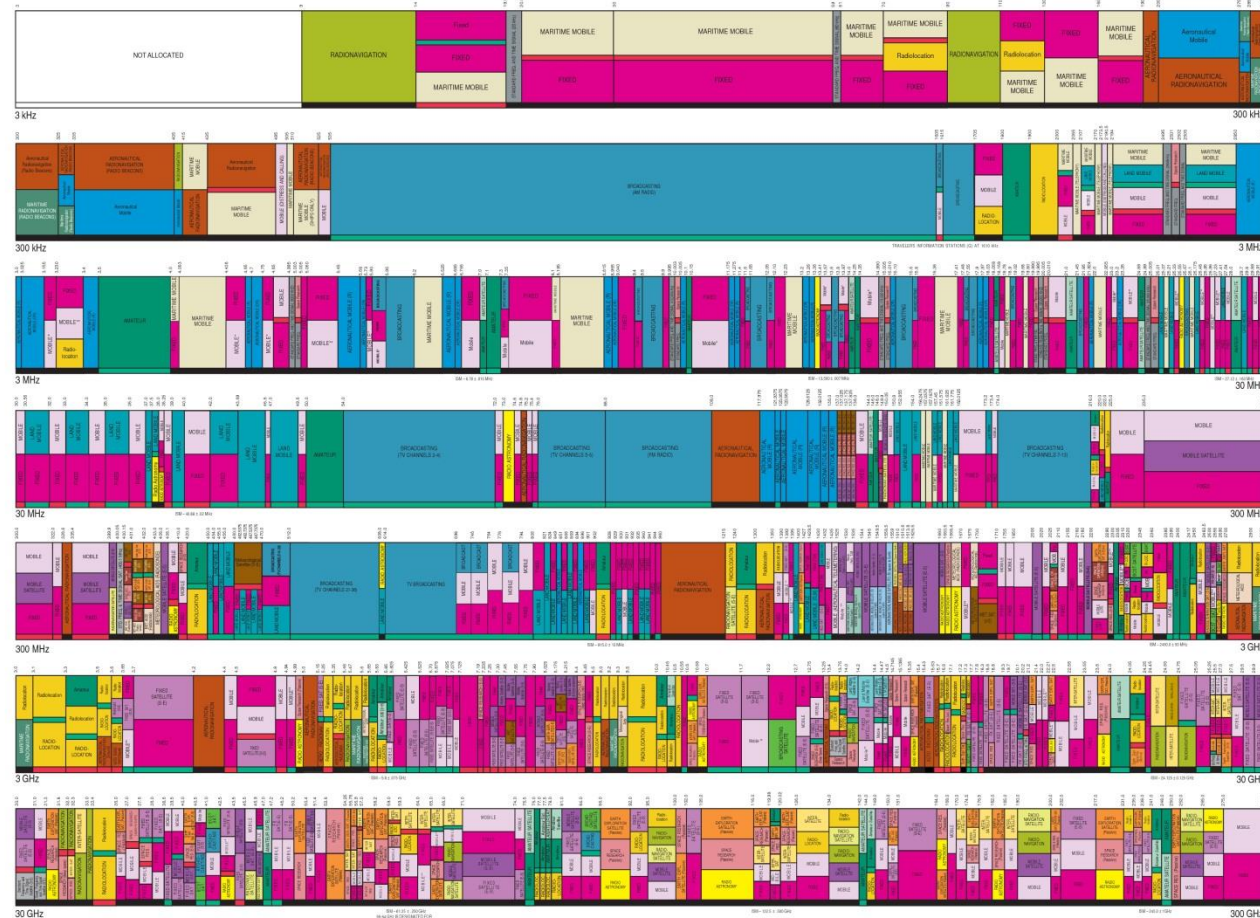
ALLOCATION USAGE DESIGNATION

SERVICE	EXAMPLE	DESCRIPTION
Primary	FIXED	Capital Letters
Secondary	MOBILE	1st Capital with lower case letters

This chart is a graphic representation in part of the Table of Frequency Allocations used by the FCC to manage the radio spectrum and coordinate radio frequency use. For complete and current information, please refer to the Table of Frequency Allocations. Therefore, for complete information, users should consult the Table of Frequency Allocations published by the FCC.

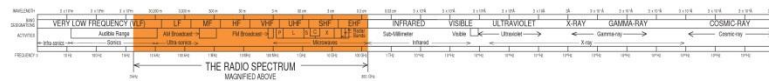


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PLEASE NOTE: THE SPACE ALLOCATED FOR SERVICES IN THIS CHART IS NOT NEARLY PROPORTIONAL TO THE ACTUAL AMOUNT OF SPECTRUM OCCUPIED.



Economic impact of spectrum and spectrum valuation

– Concepts of value

	Economic Welfare	Economic Contribution	Productivity Increase
Other Industries		✓	✓✓
Consumer Benefit	✓✓ (Wifi – USD 59 to 99 billion in consumer surplus)		✓
GDP	2% (UK, value of mobile comms.)	✓ Stimulus (e.g. USD 14 billion, 0.5% of GDP Value added, in AU)	✓ Long-term (mobile 0.39% globally)
Practical Estimation		Easiest	Hardest



With all this value – how to promote transition?

- How to best use spectrum to promote social and economic development?
- How to transition spectrum from less to more valuable uses?
 - Provide incentives for this transition
 - Let market forces work
 - Preserve critical government services
 - Stimulate competition



Spectrum availability and efficiency



EFFICIENCY: INNOVATIVE LICENSING REGIMES



Licensing regimes

Individual authorisation (Individual rights of use)		General authorisation (No individual rights of use)	
Individual license	Light licensing	License exempt	
Individual frequency planning / coordination Traditional procedure for issuing licenses	Individual frequency planning / coordination Simplified procedure compared to traditional procedure for issuing licenses With limitations in the number of users	No individual frequency planning / coordination Registration and/or notification No limitations in the number of users nor need for coordination	No individual frequency planning / coordination No registration nor notification

More invasive regulation



Unlicensed spectrum



- 65% (451m) of 690m HH with fixed BB use Wi-Fi (Strategy Analytics)
- Wi-fi penetration: NL (80.4%), KR (76.4%), NO (76.2%), UK (72.1%) – Strategy Analytics
- 46% of global mobile traffic off-loaded to Wi-Fi or femtocell in 2014 (CISCO)
- USD 222 billion per annum in the United States (Katz, 2014)



Licensed shared use of spectrum

- Concept: share spectrum in a licensed or light-licensed environment
- Proposals:
 - Licensed Shared Access (FCC's 3.5 GHz, RSPG)
 - White spaces
 - Femtocells/small cells (e.g. Japan, Netherlands)
 - Authorised Shared Access -





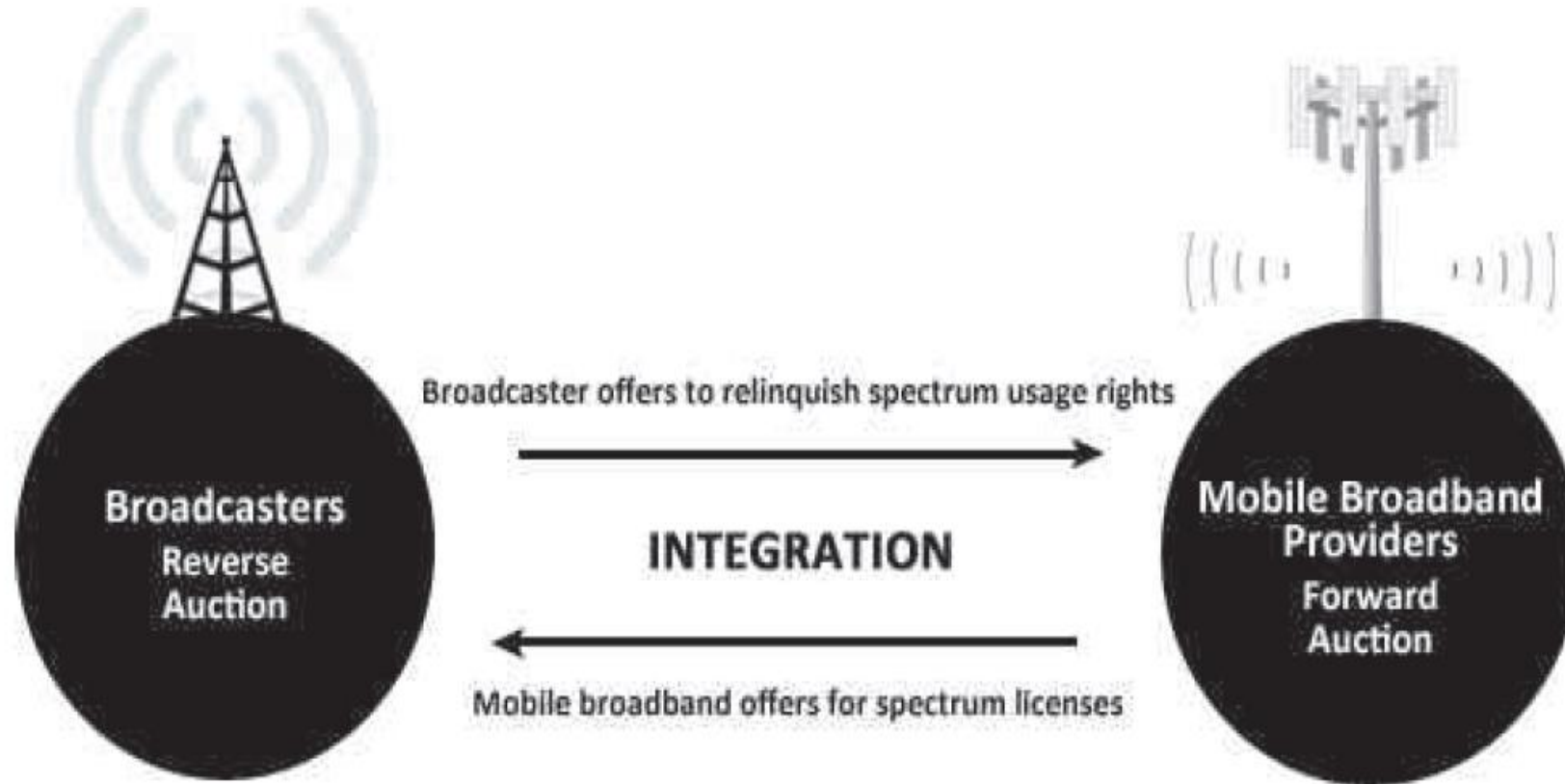
Important aspects to consider for Light-licensing regimes

- Who would be interested? Business models?
Remuneration?
- How to guarantee QoS – mitigate interference
- LSA should apply to MNOs and government spectrum holders alike – if spectrum is indeed underutilised (definition of incumbent)
- Favour third-party management (e.g. femtocells deployed by private companies) to promote innovation
- Legacy allocations/government services

AVAILABILITY:
INCENTIVE AUCTIONS



Incentive auctions: enable transition from less to more valuable uses of spectrum





Innovative approach being currently designed in the United States

- Spectrum auctions are increasingly complex...
for good reasons
- Incentive-based auction is a good idea to facilitate transition – but needs to be successful
- The repacking process is a challenge
- It's a first in OECD countries



Conclusions

- Spectrum is critical for the internet economy
- You need to get the mix right in terms of licensing regimes
- Promote “liberal” approaches to spectrum management as much as you can
- Provide the right incentives to maximise these benefits and promote efficiency



THANK YOU