

# *The Ofcom Spectrum Journey*

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## Spectrum reform is a journey....

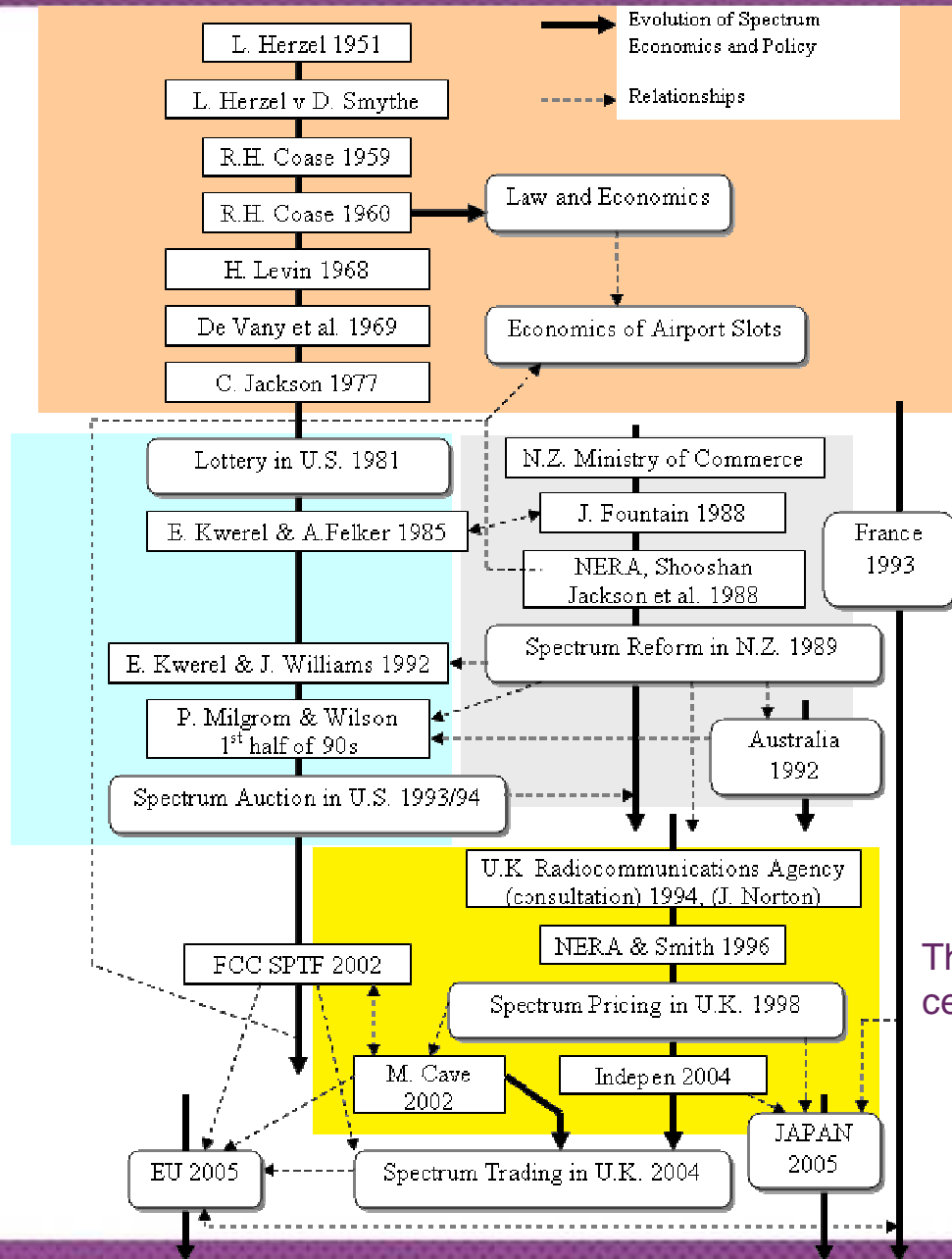
- In the beginning
- The Radiocommunications Agency
- Ofcom and the Spectrum Framework Review
- Spectrum engineering – SURs and disruptive technologies
- Lessons learnt and implications for others
- Next steps

## In the beginning came Coase

- The Coase Theorem [1960] suggests that " the efficient solution will be achieved independently of who is assigned the ownership rights, so long as someone is assigned those rights"



# More history



The theory stage

New Zealand and Australia try new ideas

The UK moves centre stage

*From a paper by Phillipa Marks and Kiyotaka Yuguchi*

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## A seminal work was the “Economic Value of Spectrum” (UK - 1995)

Sector	2006		2002	
	Value (£ billion)	Percentage (%)	Value (£ billion)	Percentage (%)
<b>Total</b>	<b>44.8</b>	<b>100</b>	<b>28.2</b>	<b>100</b>
<i>of which:</i>				
Public mobile	21.8	49	14.4	51
Broadcasting	14.7	33	5.9	21
Satellite links	2.8	6	2.9	10
Fixed links	3.9	9	3.8	14
Wireless broadband	0.3	1	-	-
Private mobile radio	1.2	3	1.1	4
Other	0.1	0	0.1	0



## This opened the way for the introduction of pricing (Smith-NERA 1996)

Current	£m
2G mobile operators	69
Ministry of Defence	55
Fixed links	19
Private & Public Business Radio	9
Emergency Services	3
Remainder	11

## Next the Government commissioned the Cave Review

- Unsurprisingly for an economist, Cave argued that market mechanisms should be applied to spectrum
- Where not possible, proxy market mechanisms such as pricing should be employed
- Recommended trading, liberalisation and pricing
- Provided increased legitimacy for the introduction of market forces



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## In 2004 we produced the Spectrum Framework Review (SFR)

### **The Given: Fulfil our statutory duties**

Ensure optimal use of the spectrum

Take account of the needs of all spectrum users

Maximise economic benefits of the spectrum

### **The Ambition:**

#### **Make the UK the leading country for wireless investment & innovation**

A better signposted approach to spectrum, giving more certainty in the market

A flexible approach to spectrum, providing opportunity for innovation

A competitive communications market, providing opportunity for returns on investment

## The SFR said that there are three possible ways to manage spectrum

**Command & Control**  
Ofcom manages it

Approach that was adopted for about 94% of the spectrum

**Market Forces**  
Companies manage it

Approach advocated by Cave and implemented by trading and liberalisation

**Spectrum Commons (Licence-exempt)**  
Nobody manages it

Approach currently adopted for 6% of spectrum, some argue for radical increase

- We need to decide the right balance between methods

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## A new form of licensing is needed – it can either be focussed around transmitters or receivers



### Transmitters

- Restrictions on the in-band and out-of-band powers that can be emitted
- Simple and flexible
- But does not control interference

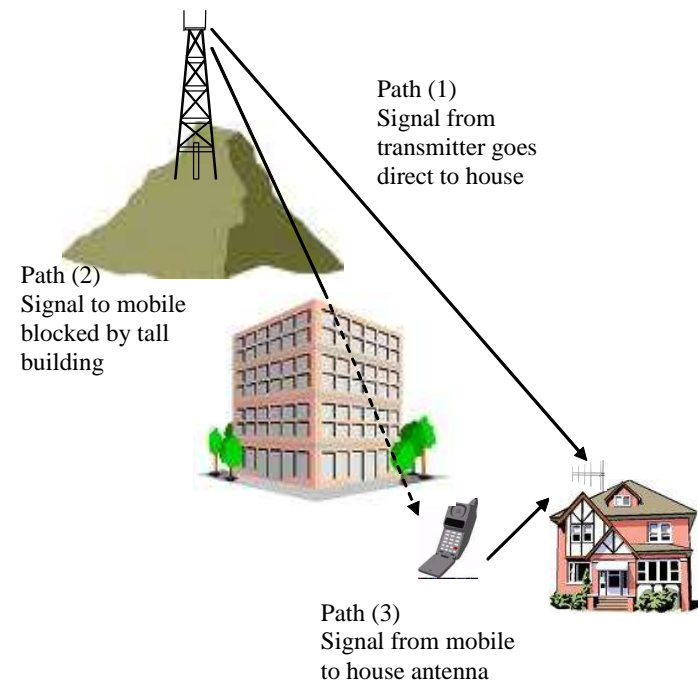


### Receivers

- Restrictions on the amount of interference that can be caused to others
- More complicated and less flexible
- But provides a high level of protection and certainty for neighbours

## Cognitive or white space access

- Economics are more difficult
- Hence, we will not mandate in spectrum owned by others
- But interleaved spectrum is different
- Application and implementation now being defined and moving ahead



## The Ofcom Spectrum Vision

- **Spectrum should be free of technology, policy and usage constraints as far as possible**
- **It should be simple and transparent for licence holders to change the ownership and use of spectrum**
- **Rights of spectrum users should be clearly defined and users should feel comfortable that they will not be changed without good cause**

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## Since Ofcom's formation in 2003...

- Multiple auctions held
- Two major auctions in train but much delayed
- SURs implemented
- UWB implemented
- Trading implemented across some licence classes
- Cave Audit completed and much downstream activity

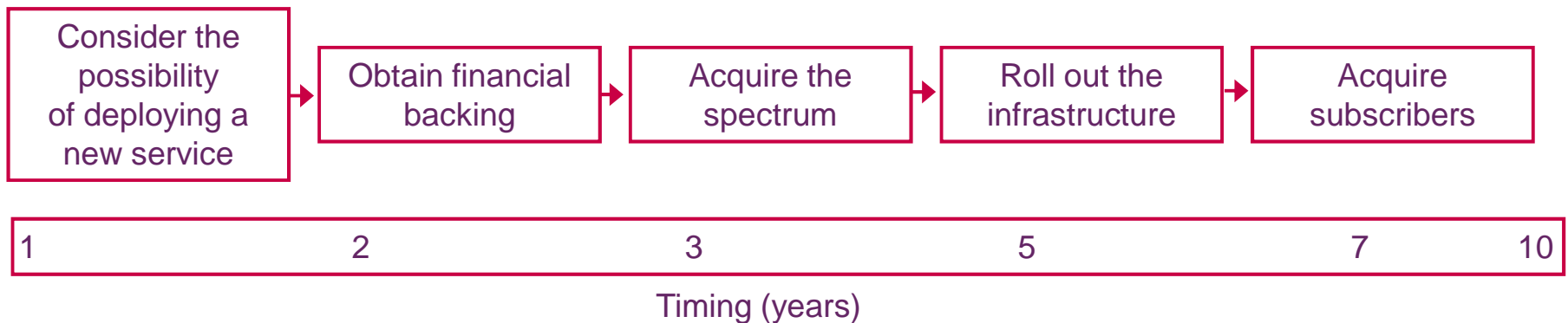


## Key lessons

- Evidence-based analysis is very powerful
- Implementation is much more difficult than we anticipated
- We often have less autonomy than we thought
- Interrelationships are complex
- Specific problems can prevent or delay us delivering generic policies
- Current licence holders can be risk averse and often prefer the status quo while the new entrants who will benefit most have a relatively weak voice



## Still too early to assess whether the new regime is better



Trading was implemented in 2004 but only in a few areas – only now are we implementing trading and liberalisation more widely

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## Continue with implementation

- No major change of direction
- Auction the remaining spectrum bands as soon as circumstances allow
- Look longer term for additional bands that might come “into play”
- Continue to consider new approaches to spectrum management such as possible extension of white space / databases
- Look for ways to do things more efficiently or better automated