



Spectrum Round Table

Spectrum Trading and Spectrum Usage Rights (SUR)

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Adrian Foster
McLean Foster & Co.

Outline – Spectrum Trading

- Spectrum Gridlock
- What is Spectrum Trading?
- What are Spectrum User Rights?
- Current Policy Framework
 - International
 - USA
 - Canada
- What is the evidence?
- Conclusion

Spectrum Gridlock

- Valuable spectrum under the administrative method is scarce and misallocated causing a loss to the economy.
- Spectrum remains with licensees who have little incentive to optimize its use or return surplus spectrum (broadcast spectrum, government exclusive use spectrum) resulting in underutilization.
- It is possible for tightly oligopolistic firms to gridlock a market by collusive hoarding of spectrum.
- Improvements in administrative spectrum assignment methods: spectrum usage charges, and liberalized licensing conditions (technology neutrality, transfers, etc.) result in more efficient use of spectrum that is assigned but do not address the underlying problem of spectrum availability and access

Trend in Reform

- Moving towards the Use of Market Mechanisms and Forces in the Management and Assignment of Spectrum.
- Issues related to:
 - Spectrum trading and secondary markets – *what should be traded*;
 - Property-rights, exclusive rights – *how to define them*;
 - Flexibility of use/unified licensing – *interference management*.

Spectrum Trading – ITU 2006

- Spectrum trading, or the transfer of Spectrum User Rights, denotes a mechanism whereby rights of use are transferred from one user to another for a certain price. In contrast to a system in which spectrum is returned to the regulator and then re-assigned, the trading approach is characterized by:
 - transfers of rights are initiated voluntarily by the present user;
 - The sum paid by the new owner of the SUR is retained, in full or in part, by the previous owner.

Transitioning to Spectrum Trading

- Valuation of Spectrum
- Incorporating Value in Investment Decisions
- Compensation of Public Sector Users?
- Use of AIP (administrative incentive prices).
- Special Market for Public Sector Uses

What Spectrum Bands S/B Traded?

- Public Interest Spectrum
 - significant part of spectrum used to provide services in the public interest should be made tradable;
 - organisations producing services in the public interest should plan their needs for more output, and acquire (and given the means to acquire) the necessary spectrum by going to the market;
 - there should be a fall-back position for unexpected emergencies, under which additional spectrum would be made available by administrative means.
- Non-exclusive Use Government Spectrum
- Non-government Spectrum (commercial/private)
- Note - Unlicensed Spectrum serves as a useful cross-check on efficient operation of the market.
 - See UK – Study 2009 on the economic value generated by current and future allocations of unlicensed spectrum.

Spectrum User Rights

- Agreement on principle:
 - a clear definition of usage rights to reduce uncertainty and enhance spectrum trading.
- Disagreement on application:
 - The SUR package includes technical features regarding time, area (including power limitations) and frequency (Ofcom, Weiser, Hatfield)
 - Flexible User Rights - overly restrictive conditions (quarantining spectrum) can act as a barrier to spectrum trading (Coase, Hazlett)
 - Usage rights should be defined to allow spectrum to be subsequently aggregated and disaggregated including geographical partitioning.
 - Too much fragmentation and partitioning (thousands of licences) obviates complementarities aspects.

Spectrum User Rights - Ofcom

- Ofcom initiated a consultation December 2007 on SUR using an example model for interference management.
- It followed up with an new consultation in 2008 on Licence Verification Approaches. Ofcom believes that several types of models needed:
 - From one downlink to another adjacent downlink.
 - From one uplink to another adjacent uplink.
 - From one downlink to an adjacent uplink.
 - From one uplink to an adjacent downlink.
- A combinations of these cases can cover situations such as the use of Time Division Duplex (TDD) technology.
- The consultation process continues.

Defining Property Rights

- Clearly defined property rights are thus a precondition for efficient spectrum markets. When trading occurs, a buyer and seller should share the same understanding of the bundle of rights and obligations which are changing hands. This is true of land, for example, and also of a spectrum licence.
- The dimensions of rights and obligations in a spectrum licence include:
 - The band which is available for use;
 - The geographical area in which it can be used;
 - The period for which the licence is entitled;
 - The licensee's degree of protection from other users;
 - The licensee's obligation not to interfere with other spectrum user's rights.
- The biggest question is - the uses to which it can be put?

Transitioning to Spectrum Markets

- Implemented in three related, but logically-distinct directions:
 - Service neutrality = the right to change use of spectrum;
 - Technology neutrality = the right to choose technology that accesses spectrum;
 - Ownership transferability = the right to transfer spectrum to another licensee who assumes rights to access, obligations, and protection associated with the licence.

Spectrum Trading Today

- UK (Europe)
- USA
- Australia

UK - Ofcom

- Ofcom began shifting UK spectrum policy towards a system of spectrum usage rights and spectrum trading in 2004 – Spectrum Framework Review:
 - Most spectrum should be assigned using market based methods including spectrum trading which includes extending the right to government users;
 - Also extended the application of AIP to the government sector.
- Trading volumes in the UK were viewed as being low and slow.
- Initiated a review in 2009 to remove perceived regulatory burden. Review completed April 2010. Conclusions are to:
 - Simplify the transfer process - removal of the need for consent for a proposed transfer;
 - Simplify the process for Time-Limited transfers;
 - Introduce Spectrum Leasing.

European Union

- In 2005, the RSPG suggested a cautious stance with regard to spectrum trading considering it to “be beneficial in certain parts of the spectrum” and that “European administrations should introduce secondary trading with due care”.
 - Wireless Access Policy for Electronic Communications Services (WAPECS) move away from narrowly specified allocations and applications where specific spectrum bands are designated
- EC, in 2005, proposed that one-third of the spectrum below 3GHz could have flexible usage rights and be tradable by 2010. Framework Directives are to be implemented in EU Law by 2011.
 - EC 2005 study estimated the gains resulting from the introduction of secondary trading combined with flexible usage at €8-9 billion per annum.

- FCC Spectrum Policy Task Force - 2002
 - advocated increased reliance on both the exclusive use and the commons models, and reduced use of traditional allocation mechanisms;
 - maximum feasible flexibility for licensees, limited only by interference concerns;
 - increased use of spectrum trading, including the ability to lease spectrum on a rapid or an overlay or underlay basis.

Spectrum Trading Volumes in the US

Spectrum Traded in Voluntary, Non-Pro Forma Transfers and Full Assignments of Market-Based Licenses							
by Service Code Category							
in billions of MHz-Pops							
Year	PCS	Land Mobile Commercial	Broadband Radio	Microwave	Paging	Coast & Ground	Total
1997	0.307	0.004					0.311
1998	3.051	0.013		10.576			13.640
1999	12.106	2.530		170.974			185.610
2000	13.436	0.716		9.035	0.004		23.191
2001	9.175	0.468		87.200	0.005		96.848
2002	5.390	0.354		577.000	0.012	0.014	582.770
2003	12.613	0.121		49.100	0.016	0.001	61.851
2004	14.575	0.188		14.674	0.056	0.015	29.509
2005	7.659	7.510	12.600	56.200	0.030	0.035	84.034
2006	8.918	1.100	1.030	133.000	0.052	0.093	144.192
2007	9.143	2.200	2.400	37.899	0.027	0.043	51.712
2008	12.581	0.326	18.699	10.052	0.009	0.087	41.754
2009	0.613	0.034	0.014	1.130	0.006		1.797

Source: FCC ULS Assignments and Transfers, License databases.

- The magnitudes as presented are derived by calculating the MHz-Pops of market-based licenses since these are relatively convenient to calculate. The FCC provides files listing the populations of the market areas under such licenses, as well as the frequencies to which the licenses give “ownership.” These allow for the calculation of MHz-Pops values which may then be tied to assignments and transfers.

US – Completed Assignments – Transfers and Changes in Control

Receipt Year	Notification-Track ^[b]			Approval-Track ^[c]		
	Total	Assignment	Transfer	Total	Assignment	Transfer
Pre-1994 ^[d]	28	12	16	2,754	1,115	1,639
1994	130	51	79	371	116	255
1995	2	1	1	14	11	3
1996	115	49	66	62	42	20
1997	457	219	238	395	214	181
1998	365	88	277	558	236	322
1999	346	209	137	906	416	490
2000	514	311	203	2,136	1,557	579
2001	559	308	251	3,285	2,888	397
2002	287	217	70	3,181	2,646	535
2003	166	100	66	2,322	1,946	376
2004	308	158	150	2,151	1,677	474
2005	358	269	89	2,558	2,102	456
2006	327	243	84	2,661	2,010	651
2007	212	140	72	2,298	1,577	721
2008	345	149	196	1,972	1,485	487
2009	280	167	113	1,705	1,302	403
2010	17	9	8	340	285	55
Unknown ^[e]	474	447	27	31	19	12
Total	5,290	3,147	2,143	29,700	21,644	8,056

Source: FCC ULS Assignments and Transfers database

a) Current as of April 11, 2010 database update. The "ULS procedure" designation is not native to the ULS but is useful as a broad categorization of assignment or transfer process.

[b] Applications recorded as "accepted" or "granted," depending on ULS practice at the time. Many of these are *pro forma transactions between companies that qualified for forbearance. Some may take place before paperwork is filed with the FCC*

[c] Applications recorded as "consummated" or "consented to" (if consummation has not yet occurred).

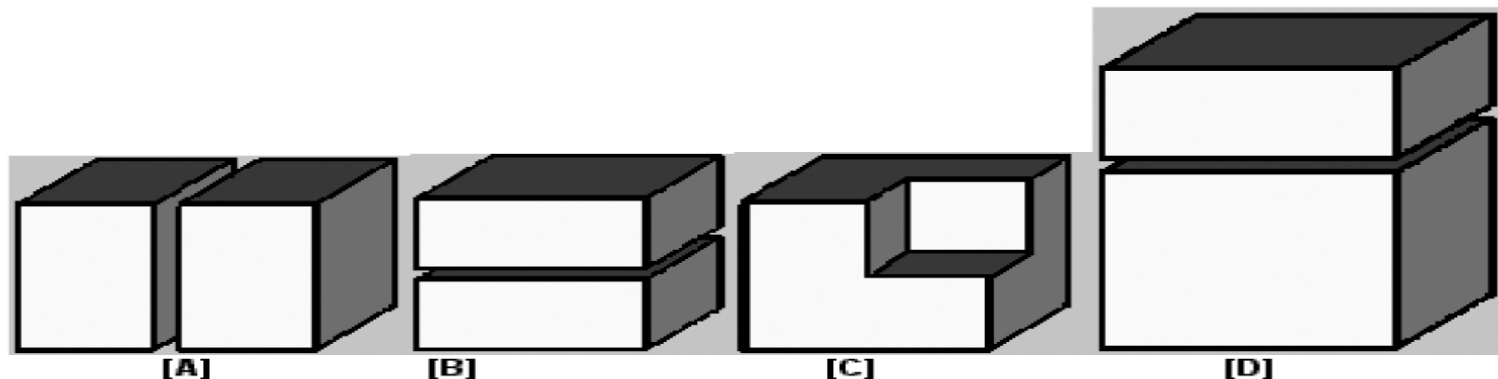
[d] Applications from this period are incomplete and likely contain errors: e.g. 23 are recorded as received in 1911, followed by 25 in 1987.

[e] Receipt date undefined. Those that have a ULS entry date are marked as entered in 1996.



Australia - ACMA

- Three types of Licences (apparatus, spectrum and class).
 - Spectrum licences represent the more market oriented form of licensing in the mixed market/administrative system.
 - Spectrum licences are fully tradable and can be divided and aggregated. They are issued for periods of up to 15 years.
- Spectrum licence can be traded in whole or in part by geography (illustrated by A), by bandwidth (see B) or by both (see C). Licences may also be leased in whole or in part to third parties. A licensee can extend the geographic coverage and/or bandwidth of their licence by acquiring an adjacent spectrum licence from another licensee (see D).



Source: Australian Communications Authority (2004). Available at <http://www.aca.gov.au>

ACMA Spectrum License Register

- The link below is the register of radiocommunications licences on the ACMA website Under Register of Radiocommunications licences.
- [http://web.acma.gov.au/pls/radcom/register_search.main_page \](http://web.acma.gov.au/pls/radcom/register_search.main_page)
- Clicking on an spectrum licence category (e.g. 2 GHz lower band), then clicking upon an individual licence on the coloured chart will bring up the licence image link.

Comments

- Necessary and helpful step in reforming spectrum management practices improving access to spectrum and flexibility in licensing.
- Especially effective for in-band and in-service spectrum characterized by scarcity - see US spectrum trading volumes.
- Defining SUR's have proven to be difficult and solutions are elusive:
 - issues include: extent to which licenses s/b liberalized, definition of rights, interference model;
 - several approaches: minimal requirements with issues resolved commercially between parties - tight ex ante rules and interference limits;
- Discussion should start in Canada and it should be expected that implementation will be incremental and evolutionary.
- Focus has shifted from trading due in part to the economy and several markets are digesting large amounts of spectrum released by auction.

Thank you



Adrian Foster

Partner
McLean Foster & Co.
+1 613 256 6128
afoster@mcleanfoster.ca

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