

# Enabling Efficient Wireless Communications: The Role of Secondary Spectrum Markets

John Mayo  
mayoj@georgetown.edu

Scott Wallsten  
scott@wallsten.net

April 17, 2009

Most policy and research focuses on initial allocation

- Comparative hearings
- Lotteries
- Auctions

Very important, but....

Demand and supply change over time, so initial allocation may not remain efficient.

Secondary markets can ensure that spectrum continues to be put to its highest-value use over time.

 Do they?

- ✓ • What are secondary spectrum markets?
- ≈✓ • How big are these markets?
- ≈✗ • What barriers, if any, block an efficient market?
- ≈✗ • Have policy changes increased efficiency/liquidity?

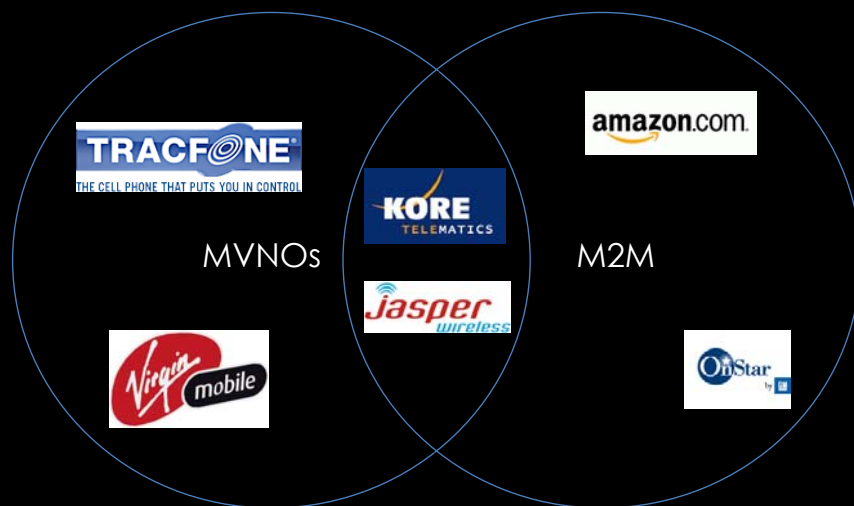
What are secondary spectrum markets?

Any market transaction after the initial allocation  
*except*  
those involving retail sales by initial leaseholder to end users.

Two broad categories

1. Spectrum license leases and transfers by initial leaseholder [owner] to a third party.
2. Wholesale purchases and resale by other firms to end-users.

Wholesale purchases and resale by other firms to end-users



M2M: Data communications between machines.

Some unlicensed, but most uses licensed spectrum and existing networks.

- vehicle fleet management, security systems, smart grid metering, etc.

## M2M: How big?

Hard to say for sure, but estimates suggest

22 million M2M devices in North America

\$3.5 billion in cellular revenues worldwide

\$40 billion in total revenues (hardware, services)

FWIW, analysts projecting 25% CAGR for foreseeable future.

## Spectrum license trades and leases

FCC attempts to promote secondary market beginning with a policy statement in 2000 defined necessary framework:

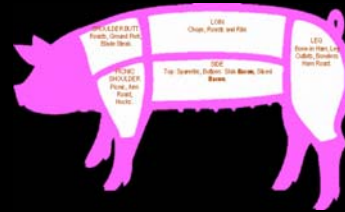
1. Clearly defined economic rights
2. Easy entry and exit
3. Full information on prices and products
4. Mechanisms for bringing buyers and sellers together
5. Many buyers and sellers

## Spectrum license trades and leases

Issue: Spectrum property rights not always easy to define (e.g., Hatfield & Weiser).



≠



- Peter Cramton (paraphrasing)

## Spectrum license trades and leases

Issue: Easy entry and exit.

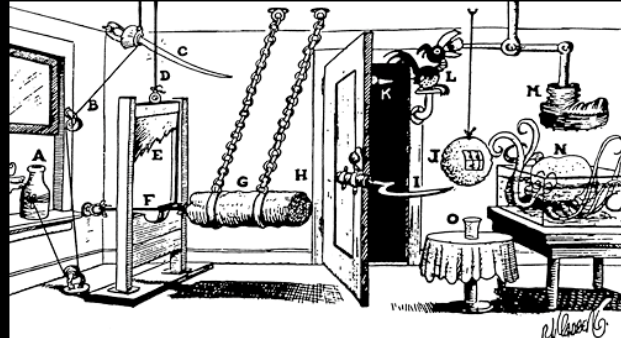
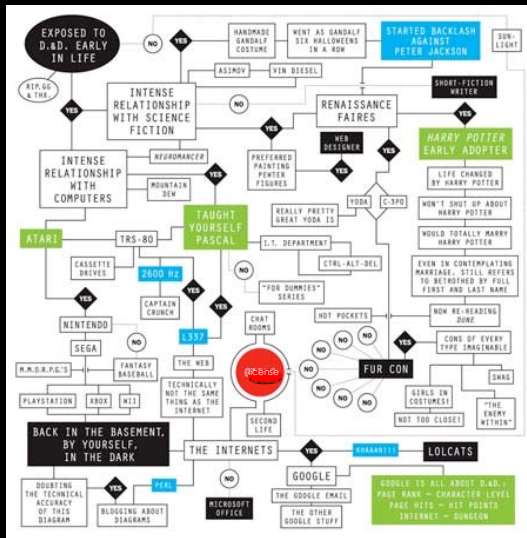
2003 and 2004 FCC Orders made it easier to trade spectrum.

- Streamlined approval process for most trades & leases. Even if not eligible for automatic approval, decision reached in 21 days.

# Spectrum license trades and leases

Issue: Full information on prices & products, or how do you find out who owns what?

FCC operates Universal Licensing System (ULS)



## Spectrum license trades

Year	Assignment	Transfer
Pre-1994	1115	1,639
1994	116	255
1995	11	3
1996	42	20
1997	214	181
1998	236	322
1999	416	490
2000	1,557	579
2001	2,888	397
2002	2,646	535
2003	1,946	376
2004	1,677	474
2005	2,102	456
2006	2,020	651
2007	1,579	722
2008	1,515	479
2009	178	37
Unknown	19	12
<b>Total</b>	<b>20,277</b>	<b>7,628</b>

Assignment = transaction in which license (full or part) is assigned from one licensee to another.

Transfer of control = Licensee remains the same, but ownership of licensee changes.

Source: Derived from FCC ULS.

## Spectrum license trades

### Changes in Assignments of Authorization and Transfers of Control

Receipt year	Cellular	PCS	Industrial/ Business	Land Mobile	
				Commercial	Private
1994	0	1	0	0	0
1995	0	13	0	0	0
1996	0	54	0	1	0
1997	0	392	0	1	0
1998	136	177	0	14	0
1999	238	267	2	39	0
2000	234	295	534	489	12
2001	23	278	1,600	1,082	71
2002	38	188	2,017	589	47
2003	33	294	1,419	272	80
2004	98	235	1,431	173	50
2005	31	237	1,560	455	47
2006	100	220	1,500	373	75
2007	120	191	1,370	166	62
2008	103	182	1,075	93	57
2009	0	10	133	9	6
Totals	1,154	3,034	12,641	3,756	507

Source: Derived from FCC ULS.

## Spectrum license leases and subleases

### Changes in Assignments of Authorization and Transfers of Control

Year	Total	Lease length	Total	Cellular	PCS	Educational Broadband
2004	120					
2005	325					
2006	355					
2006	171	Short	10	1	4	-
		Long	161	-	10	128
2007	620	Short	79	8	44	6
		Long	541	-	61	403
2008	574	Short	202	29	106	6
		Long	372	2	51	219
2009	46	Short	15	1	3	-
		Long	31	-	7	14

Source: Derived from FCC ULS.

Work in progress:

- Normalize number of trades
- Incorporate magnitude of trades
- Test effects of policy changes