Incentive Auctions

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Incentive auctions

Auction includes essential regulatory steps to address market failures in the secondary market for spectrum.
Letter from 112 economists, 6 April 2011
Motivation

Value per MHz

Value of over-the-air broadcast TV

TV signal received via cable and satellite

Value of mobile broadband

Explosion in use of smartphones and tablets

Gains from trade

Year

VHF and UHF bands

Current uses (TV broadcast)

Possible future uses

TV ch 2-6
TV ch 7-13
TV ch 14-36
TV ch 38-51
TV ch 38-51
TV ch 14-??
Voluntary approach

For simplicity, I assume that channel sharing is only 2:1; other possibilities could also be considered, including negotiated shares with particular partners announced at qualification.
Why voluntary?

• *More likely to quickly clear spectrum*
  – Broadcasters benefit from cooperating

• *Lower economic cost of clearing*
  – Spectrum given up only by broadcasters who put smallest value on over-the-air signal

• *Market pricing for clearing*
  – Avoids costly administrative process

• *Efficient clearing*
  – Clear only when value to mobile operator > value to TV broadcaster
Two approaches

Combinatorial exchange

Too complex due to repacking

Reverse auction to determine supply

Optimization gives mandatory repacking options

Forward auction to determine demand

Market clearing and settlement
• Mostly single channel
• Price discovery less important

=>
• Sealed-bid auction or descending clock
  – Price to cease
  – Price to share
Reverse auction to determine supply

\[ P = \$30 \]

\[ S = 48 \]

\[ \text{Price} = \$30/\text{MHzPop} \]
Reverse auction to determine supply

Washington DC

$P = 20$

$S = 36$

Price = $20/MHzPop

0 MHz

3 MHz

6 MHz

7

13

9

22

31

18

41

47

37

44

35

6 MHz
Reverse auction to determine supply

\[ P = $10 \]

\[ S = 24 \]

Washington DC

Price = $10/MHzPop

\[ \text{Price} = \frac{10}{\text{MHzPop}} \]
P = $20
S = 36

Supply = 160 MHz

Mandatory repacking
Forward auction to determine demand

- Mobile operators want large blocks of contiguous paired spectrum for LTE (4G)
  - One to four $2 \times 5$ MHz lots
- Complementarities strong both within and across regions
- Package clock auction ideal
  - Within region complementarities guaranteed with generic lots
  - Across region complementarities achieved through optimization of specific assignments
Package clock auction: Overview

- Auctioneer names prices; bidder names package
  - Price increased if there is excess demand
  - Process repeated until no excess demand
- Supplementary bids
  - Improve clock bids
  - Bid on other relevant packages
- Optimization to determine assignment/prices
- No exposure problem (package auction)
- Second pricing to encourage truthful bidding
- Activity rule to promote price discovery

Forward auction to determine demand.
Forward auction to determine demand

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>P*</td>
<td>Q*</td>
</tr>
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</table>

Graph showing supply and demand curves intersecting at point $P*$ and $Q*$.
Forward auction to determine demand

Broadcasters cannot negotiate ex post with operators, since it is the FCC’s repacking that creates value; ex post trades would not benefit from repacking.
Ways Congress can screw up

• Impose restrictions on which broadcasters can participate in the auction
  – Destroys competition in reverse auction

• Make repacking purely voluntary
  – Creates holdout problem in reverse auction
  – Reverses status quo—FCC can relocate stations

• Too greedy
  – Impose specific requirement on government revenue share (e.g., Treasury gets 40% of revenue)
Not too greedy: Quantity choice left to FCC
Too greedy constraint: Treasury must get at least 40%

Revenue share constraint causes huge social welfare loss and reduces Treasury revenues!
Ways FCC can screw up

• Impose restrictions on which broadcasters can participate in the auction
  – Destroys competition in reverse auction
• Make repacking purely voluntary
  – Creates holdout problem in reverse auction
  – Reverses status quo—FCC can relocate stations
• Adopt poor auction design
• Fail to address competition concerns
Statutory language: Motivation

• Since 1993, the FCC has demonstrated an outstanding ability to design and implement auctions

• As a result of this outstanding record, Congress should provide the FCC with broad auction authority focused on key objectives
  – Transparency
  – Efficiency
  – Protections to assure success
Statutory language: Objectives

• Transparency
• Efficiency: Put spectrum to its best social use
• Protections to assure program success
• Protections to assure best available science and practice

Little more than these objectives is needed in legislation given the FCC’s strong track record in designing and implementing auctions; details are apt to do more harm than good in this case.