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

Year


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
VHF and UHF bands

Current uses (TV broadcast)

- Lower VHF
  - TV ch 2-6
- Upper VHF
  - TV ch 7-13
- UHF
  - TV ch 14-36

Possible future uses

- Lower VHF
  - TV ch 2-6
- Upper VHF
  - TV ch 7-13
- UHF
  - TV ch 14-??
  - Flexible Use
  - RA
  - Flex. Use
  - RA
  - Flexible Use
Voluntary approach

TV broadcaster freely decides to

Continue over-the-air broadcast

Share with another

Cease over-the-air broadcast

Spectrum freed

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

Price = $30/MHzPop

\[ \text{Price} = \$30 \]

\[ P = 48 \]

\[ S = 48 \]
Reverse auction to determine supply

Washington DC

\[ P = $20 \]

\[ S = 36 \]

Price = $20/MHzPop

0 MHz: 7
3 MHz: 9, 13, 22, 41
6 MHz: 31, 18, 47
44, 35
Reverse auction to determine supply

Washington DC

\[ P = \$10 \]

\[ S = 24 \]

\[ \text{Price} = \$10/\text{MHz} \]
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
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
  – Reverses status quo—FCC can relocate stations
  – Creates holdout problem in reverse auction
• Too greedy
  – Impose specific requirement on government revenue share (e.g., Treasury gets 40% of revenue)
Not too greedy: Quantity choice left to FCC

Price

Supply

Demand

$P_D$

$P_S$

To TV broadcasters

To Treasury

$Q_0$

$Q^*$

Quantity
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
  – Reverses status quo—FCC can relocate stations
  – Creates holdout problem in reverse auction
• 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.*
To meet objectives: Transparency

• Unless explicitly and narrowly justified to limit potential collusive behavior among bidders, all elements of the market from qualification, to bidding, to award, to performance will be publically disclosed.

• Modern methods will be developed to promote the disclosure of essential market elements in simple and powerful data bases.
To meet objectives: Efficiency

• Auction design based on long-run efficiency objective: Put spectrum to its best use
  – Often consistent with best private use, but
  – Adjustments to reflect divergence between social and private value, as a result of competition issues in downstream market for wireless services
    • Important role for competition policy within auction
    • Important role for competition policy after auction
    • Important role for unlicensed spectrum to enhance competition

• Efficient auction format that
  – Accommodates both selling and buying of spectrum rights
  – Fosters effective price and assignment discovery in a multiple round format
  – Has a pricing and activity rule that encourages bidders to express true preferences throughout the auction process

• Bands, standards, and other rules optimized to achieve objective of long-run efficiency

• Auction design established in collaboration with industry and other stakeholders, but led with critical input from auction design experts with substantial experience in a diversity of auction design settings
To meet objectives: Protections for participants

- **Qualification**
  - Rigorous and open qualification to bid
  - Deposit proportional to expected volume as a bid guarantee

- **Performance**
  - Clear rights and obligations for buyers and sellers
  - Simple methods to guarantee performance for parties at risk

- **Competition**
  - To assure competition in the auction and long-run competition in the downstream market for wireless services,
    - The FCC adopts a suitable competition policy within the auction
    - The FCC adopts a suitable regulatory policy in the wireless market
To meet objectives: Protections for best practice

• The FCC auctions must be designed consistent with the best science and practice
  – Expert auction design services procured via competitive bid
• The FCC auctions must be implemented consistent with best science and practice
  – Expert auction implementation services procured via competitive bid
• Independent market monitor (as in all U.S. electricity markets)
  – An independent expert shall be retained with four-year terms by the Chair of the FCC
  – Independent market monitor reports directly to the Chair of the FCC
  – Independent market monitor has available all confidential information on the market
  – Independent market monitor reports on a regularly basis (annual report and two biannual reports) on the state of the market
    • Identifies potential problems
    • Makes recommendations on addressing potential problems
  – Independent market monitor is not a judge and does not make rulings