FCC-SIEPR-NSF
Wye Woods Conference:
Lessons plus a Simple Proposal

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Safe Conclusions

- The SMR was a big advance over previous spectrum allocation practice.

- The exposure problem is *ubiquitous*
  - …and the FCC cannot always solve it by clever license definitions.

- The SMR cannot identify efficient outcomes to "*combined value*" allocation problems
  - but combinatorial bidding sometimes can.

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How Combinatorial Bidding Works

- It helps to solve two problems:
  - Searching for partitions (without serious "exposure")
  - Providing incentives for revelation and competition
- It creates countervailing incentives
  - withhold bids to avoid bidding against yourself
  - reveal information to help partners find you
- It creates a new problem, variously named:
  - "threshold," "hold-out," "coordination," "free rider"

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Controversial Conclusions?

- The design of a "large" auction should exploit situation-specific knowledge, trading off
  – Minimize complexity for auctioneer & bidders
  – Minimize bidder participation costs
  – Maximize efficiency, revenues, transparency
- Past experience is not always a useful guide.
  – Little evidence of adjacent license complementarities
  – …but nonparticipation? MCI? Cisco?

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The 700 MHz Auction

- Arguments for combinatorial bidding
  - Low complexity: the small number of licenses makes the software demands trivial.
  - Bidders' expressed preferences can all be accommodated.
  - Possibility of a very serious exposure problem
    - Insufficient spectrum bandwidth
    - Insufficient geographic scope for new entrants
- Arguments against…?
  - Mostly vague generalities

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A Simple Proposal*

- For the 700 MHz auction, allow bids on relevant combinations of the 12 licenses offered.

  – Global combination (1)

  – National combinations (2)

  – 10-20 spectrum combinations within a region (6)

- Categories of rules

  – Which bids are retained in the system?

  – How is activity & eligibility computed?

  – What bids are allowed?

  – What rules govern stopping, withdrawals & waivers?

*Prepared by Larry Ausubel and Paul Milgrom

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Design Principles for Quick and Effective Deployment

1. Keep it very, very simple!
   - Ausubel, Cramton, Riley, Nalebuff, Kwerel/FCC, Ledyard, Harstad-Rothkopf

2. Keep it as close as possible to the current SMR auction rules!

3. Include many possibilities, including at least the likely relevant combinations.
   - Plott, Smith, Ledyard,others

4. Let bidders, not rules, drive the result.
   - Porter, Rassenti, Plott, Smith

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Rules: Retained Bids

- Definition: A bid is "retained" if

    - It is a <u>global combination bid</u> and is part of the winning set

    - It is a <u>national combination bid</u> and is part of the winning set including individual bids, but *excluding* global and 10-20 combinations

    - It is a <u>10-20 combination bid</u> and is part of the winning set including individual bids, but *excluding* global and national combinations

    - It is an <u>individual license bid</u> and is the highest bid for that license.

Rules: Activity and Eligibility

- Activity
  - A bid is "active" if it is either a retained bid from the previous round or is an eligible bid in the current round.

- Eligibility
  - No bidder may make bids whose total activity exceeds its current eligibility.
  - Initial eligibility determined by deposit.
  - Eligibility(t)=Min(Eligibility(t-1),2xActivity(t-1))

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Rules: Allowable Bids

- Minimum bid
  - (1+x%) times the minimum amount to have become a retained bid in the previous round.

- Bid amounts: check box bidding
  - For combination bids, one increment only
  - For individual licenses, one or more increments.

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Rules: Stopping, Withdrawals & Waivers

- Stopping ("Fair warning! Sold!")
  - Stop after <u>two</u> consecutive rounds <u>with no new bids</u>
- Withdrawals: none allowed
- Waivers: 5

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Variants

Alternative rules and features within the same general system

Bid increments

- Instead of basing the minimum bid on a simple percentage increment, one could:
  - Determine the minimum bid directly by allocating the overall national bid, as in the RAD procedure
  - Determine the increment as the maximum of
    - The fixed percentage
    - A "per point" bid increment, where the per point increment is determined as y% of the winning total value divided by the number of total points for all licenses.

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Additional combinations

- The same rules extend without difficulty to bidding on all geographic combinations within each spectrum band. (114 combinations)

- There is no technical problem with allowing *all* combinations, but the retained bid rule would then exclude such bids unless they are part of the provisionally winning set.

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"Or" Bids

- Certain pairs of bids can be linked by the "or" operator.
  - Exclude only links between national and 10-20 pairs.
  - Allow or-links by a bidder to its retained, non-winning bids.

- Determine retained bids in sequence, as follows.
  1) Determine provisional winners. These become retained bids and bids attached to these as or-bids are cancelled.
  2) Determine the regional winners. These become retained bids and bids attached to these as or-bids are cancelled.
  3) Determine individual license winners. These become retained bids and bids attached to these as or-bids are cancelled.

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Bid Composition Restrictions

- Restriction: A bidder who bids in some round for a combination but not for some subset of that combination may not subsequently bid for the subset.

- These restrictions involve a trade-off

    – they mitigate the threshold problem, but

    – they take some flexibility from bidders.

- Usefulness of the restriction depends on an assessment of the relative importance of the two.

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