

**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.

# 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”

# 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?

# 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

# 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?

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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

# Rules: Retained Bids

- Definition: A bid is “retained” if
  1. It is a global combination bid and is part of the winning set
  2. It is a national combination bid and is part of the winning set including individual bids, but *excluding* global and 10-20 combinations
  3. It is a 10-20 combination bid and is part of the winning set including individual bids, but *excluding* global and national combinations
  4. It is an individual license bid 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.
  - $\text{Eligibility}(t) = \text{Min}(\text{Eligibility}(t-1), 2 \times \text{Activity}(t-1))$

## 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.

# Rules: Stopping, Withdrawals & Waivers

- Stopping (“Fair warning! Sold!”)
  - Stop after two consecutive rounds with no new bids
- Withdrawals: none allowed
- Waivers: 5

# 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.

## 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.

## “Or” Bids

- Certain pairs of bids can be linked by the “OR” operator.
  - Allow most or all OR links.
  - 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 and national 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.

# 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.
- The restriction is most valuable when the threshold problem is important and the reduced flexibility is unimportant, as is probably the case in the 700 MHz auction.