

Serious Difficulties with “Or” Bids in Combined-Value Auctions

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I have seen no clear, let alone convincing, explanation of why bidders in FCC auctions would be better off, or better able to compete, if given the option of submitting “or” bids. “Or” bids means rules that allow a bid such as “I bid either \$100 for the NE 10-MHz license, or \$300 for the MA 20-MHz license, but not both.” (Rarely if ever would a bidder be indifferent as to which of these two bids to make. If he were, he could make either; logically, his subjective probabilities that one bid or the other would end the bidding on that license should determine the preferred bid to submit.) But this notion has had some influential proponents at the recent Wye Woods conference.

I indicate here why it is simply too problematic for the FCC seriously to entertain the notion of permitting “or” bids.

Rothkopf, Pekec and I circulated a working paper in 1995, later published in *Management Science* in August 1998, indicating that the current proposal is guaranteed to be computationally manageable. When bidders can bid on individual licenses, and make combined value bids only on rows, columns, or the entire grid of licenses, an algorithm we supplied manages computing the set of licenses that maximizes revenue. The problem of maximizing revenue can become computationally unmanageable when “or” bids are added to the set of permitted bids.

However, the principal problem I point to with “or” bids is real and simple. To date, the FCC has consistently taken the position that bids will be rejected if there are equally competitive bids that were submitted earlier. Breaking ties is an essential exercise in an auction, particularly with “click-box bidding.” Using bids’ time stamps to break ties is an eminently defensible position in a situation where the huge stakes would otherwise make litigation all too likely. This FCC position would no longer be possible if “or” bids were permitted. Indeed, the question of which bids were tentative winners could become inexorably complex.

First, consider the simplest of examples. Suppose round 2 ended with bids of \$20 and \$50 on the 10- and 20-MHz licenses in the Mid-Atlantic region (MA) and bids of \$25 and \$45 on the corresponding licenses in New England (NE), and with each pair of bids summing in excess of the high row bid for that region. Hence, the row bids for MA and NE are not retained going into round 3. Let the minimum bid increment be 10%.

Now suppose the only relevant bid submitted in round 3 is an “or” bid: “I bid either \$77 for the NE row, or \$77 for the MA row, but not both.” What are the tentatively winning bids? This bid clearly supplants one or the other of the pairs of bids in these regions, but which? Clearly not both; the bidder has ruled out that possibility. Even an attempt at time-stamping to break ties would seem silly: all the relevant bids were submitted at least one round before. Moreover, the earliest of the four time stamps could be in the same region as the latest.

If I were the FCC, I would hardly want the responsibility of facing whichever set of bidders I had told that they no longer had standing bids. Case closed.

I consider further examples merely to show how convoluted the problem of finding the winning bids is.

The second example has the following bids on individual licenses at the end of round 11:

Bid in region:	10-MHz	20-MHz
NE	40	100
MA	50	90
SE	40	70
GL	40	100
CM	30	90
PA	50	110

The only row bid in excess of its row sum is a bid of 112 on the SE row, and the column bids are 251 for the 10’s column, and 569 for the 20’s column. The high global bid is not competitive. The two column bids are the tentative winners, as the individual bids in the columns sum to 250 and 560. Maximum revenue is 820.

The only bid submitted in round 12 is: “I bid either [a] \$33 for the CM 10-MHz license and \$77 for the SE 20-MHz license, or [b] \$121 for the PA 20-MHz license, but not both.”

In this case, *the tentative winner for every license changes* depending on which of the two exclusive parts of the “or” bid is accepted. Accepting either part (both meet minimum bid requirements) increases revenue from 820 to 822. Accepting part [a] removes the 10’s column bid, and retains the 20’s column bid as a tentative winner, while accepting part [b] does the reverse.

As my final example, I take the same results at the end of round 11, and just switch what the “or” bid is that is the only bid submitted in round 12. It is instead: “I bid either \$110 for the CM row, or \$121 for the PA 20-MHz license, but not both.” This bid is different because the bidder does not face the same level of exposure for the two parts of the bid (again, both meet minimum bid requirements). One might think that putting more money on the table for the second part solves our problems. Nonetheless, accepting either part increases revenue from 820 to 822. Accepting the first part switches the tentative winners from columns to rows. Accepting the second part leaves individual bidders in the 20’s tentative winners, and the 10’s column bid remains the other tentative winner.

It is clear to me that, with a little work, I can construct an example with the following properties. Two “or” bids are submitted in the same round, one by bidder A, one by B. If we consider bidder A’s two parts first, either could be among a revenue-maximizing collection, but either rules out one part of bidder B’s “or” bid as retainable. However, if we consider bidder B’s “or” bid first, either could be among one of two different revenue-maximizing collections, but either rules out one part of bidder A’s “or” bid as retainable. But what’s the point? It is already clear from these examples that allowing “or” bids can leave the FCC in a completely untenable position.

References:

Rothkopf, M. H., A. Pekec and R. M. Harstad, “Computationally Manageable Combinatorial Auctions,” RUTCOR working paper, Rutgers University, 1995.

Rothkopf, M. H., A. Pekec and R. M. Harstad, “Computationally Manageable Combinatorial Auctions,” *Management Science*, 44 (1998), 1131-47.