Comments on Experimental Design for Evaluating FCC Spectrum Auction Alternatives

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We are responding to Public Notice DA 05-1267, which seeks comment on the proposed experimental design to evaluate aspects of the FCC's alternative auction methods, both with and without package bidding. The experimental design is ambitious. Our main comment is that the effort will be more productive if there is more focus on elements for which past experience and existing knowledge does not provide adequate support with which to make a selection.

Major comment: Test the clock and clock-proxy auction designs

We believe it is a mistake to focus all attention on the simultaneous multiple round auction (with and without package bids), given that there is substantial theory and experience suggesting that a clock auction or clock-proxy auction would perform better in the FCC setting.

There are several advantages to the clock implementation, described in greater detail in our paper, "The Clock-Proxy Auction: A Practical Combinatorial Auction Design." Some of our other references related to clock auctions and proxy auctions are listed at the end of this Comment.

The clock auction is a simpler process than the simultaneous ascending auction. Bidders are provided the minimal information needed for price discovery—the prices and the excess demand. Bidders are not distracted by other information that is either extraneous or potentially useful as a means to facilitate collusion.

The clock auction also can take better advantage of substitutes, for example, using a single clock for items that are near perfect substitutes. In spectrum auctions, there is a tendency for the FCC to make specific band plans to facilitate the simultaneous ascending auction. For example, anticipating demands for a large, medium, and small license, the FCC may specify a band plan with three blocks—30 MHz, 20 MHz, and 10 MHz. Ideally, these decisions would be left to the bidders themselves. In a clock auction, the bidders could bid the number of 2-MHz blocks desired at the clock price. Then the auction would determine the band plan, rather than the FCC. This approach is more efficient and would likely be more competitive, because all bidders are competing for all the bandwidth in the clock auction. With the preset band plan, some bidders may be uninterested in particular blocks, such as those that are too large for their needs. The proposed experimental design does not address this important issue.

Clock auctions are faster than a simultaneous ascending auction. Simultaneous ascending auctions are especially slow near the end, when there is little excess demand. For example, when there are six bidders bidding on five similar licenses, then it typically takes five rounds to obtain a one bid-increment increase on all items. In contrast, in a clock auction, an increment increase takes just a single round. Moreover, intra-round bids allow larger increments, without introducing inefficiencies, because bidders still can express demands along the line segment from the start-of-round prices to the end-of-round prices.

The clock auction limits collusion relative to the simultaneous ascending auction. Signaling how to split up the items is greatly limited. Collusive strategies based on retaliation are not possible, because bidder-specific quantity information is not given. Further, the simultaneous ascending auction can have a tendency to end early when an obvious split is reached, but this

cannot happen in the clock auction, because the bidders lack information about the split. Also there are fewer rounds to coordinate a split. The proposed experimental design does address this issue by considering two information policies.

The clock auction can be implemented as a package auction and thus eliminate the exposure problem. This is accomplished by letting a bidder reduce quantity on other items as long as at least one price increases. The bid is binding only as a full package. Hence, the bidder can safely bid for synergistic gains.

The clock auction determines minimum bids for packages that are different from those imposed by some versions of the SMRPB design and easier for human bidders to anticipate and understand. Minimum bids for packages are necessary to complete complex auctions with many goods in a reasonable amount of time, and all rules that are effective in speeding the auction necessarily risk impairing efficiency of the auction outcomes. The advantage of the clock rule over other minimum bid rules is its simplicity and predictability, which should make it the leading candidate for a package bidding design.

The main advantage of the proxy phase is that it pushes the outcome toward the core, that is, toward an efficient allocation with competitive payoffs for the bidders and competitive revenues for the seller.

In the proxy phase, there are no incentives for demand reduction. A large bidder can bid for large quantities without the fear that doing so will adversely impact the price the bidder pays.

The proxy phase also mitigates collusion. Any collusive split of the items established in the clock phase can be undone in the proxy phase. A relaxed activity rule means that the bidders can expand demands in the proxy phase. The allocation is still up for grabs in the proxy phase.

Given these advantages of the clock auction and clock-proxy auction, we believe it would be more productive to test the clock-based designs earlier, rather than later. Indeed, if there is only time or money to look at either clock or non-clock auctions, we recommend that the clock implementations be the focus.

Minor comments

We also have a number of minor comments.

We agree that the simplified approach with a single common value signal (eq. 1.2) is both simpler and more realistic.

We like the parametric approach where the valuation of a package depends on a few parameters.

In auctions where the licenses differ greatly in the population covered, the scale component is better represented by the population covered rather than the number of licenses. However, in the context of the experiment it seems fine to have licenses about the same size.

The valuation model (eq. 1.3) is too simple to address the differing effects of geographic coverage and bandwidth. For example, it is common for bidders to have diminishing marginal value for bandwidth in a geographic area and yet increasing returns with greater geographic coverage. This is not possible with the proposed model.

The experimental design mentions budget constraints, but then they are not considered in any of the treatments. We recommend against focusing on budget constraints at this stage.

Although bidders often have budget constraints, we have never seen them take the simplistic form described in the experimental design. Budget constraints are more complex in practice than a single bright-line number. First, budget constraints change over the auction. Often, there are multiple constraints, such as a $/pop for various license categories, constraints on internal rate of return, or an increasing cost of capital with additional expenditure.

The study of revenue performance of the proposed design is underdeveloped. Revenue and efficiency performance are closely related to the analysis of whether outcomes are in the core (Ausubel and Milgrom 2002). The experiments should report not only on whether the outcome is in the core, but should compare auction revenues to the minimum seller revenues in the core and, as a diagnostic, should report which core inequalities fail in each treatment and by how much they fail.

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