

1. Reverse Auctions: TV stations submit bids to voluntarily relinquish spectrum rights to the FCC in exchange for payments.

2. Repacking: Repacking is a reorganization of the broadcast television bands where television stations that remain on-the-air will occupy a smaller portion of the UHF band.

3. Forward Auctions: Forward auctions identify the prices that potential users of repurposed spectrum would pay for the new licenses.

9. The Importance of Reverse Auctions. The design of reverse auction is important for 2 reasons:

1. Active participation by TV stations is important for the success of the incentive auctions in reclaiming large amount of spectrum and raising revenues.

2. TV stations going off the air or moving to the VHF band will provide spectrum for TV white space uses that are important for experimentation in new technologies, community broadband services for underserved areas, scientific uses (radio astronomy), and emerging IEEE 802.1af white-fi technologies.

10. The State of the Art of the Reverse Auctions: Milgram and Segal (2013), Milgram and Segal (2013)’s deferred acceptance heuristics auctions.

1. Bid collection procedures. Each seller submits one offer.

2. Assignment procedures. Sellers’ offers are evaluated with the scoring functions. The buyer rejects the offer with the highest score. The scores are updated with the updated set of frozen sellers. The auction ends when all offers are zero scores and these offers are accepted.

3. Procedures of determination of payments. The payment for the winner is the threshold price.

The theorem: when sellers are single-minded and make only one offer, the auction mechanisms are strategy-proof.


The research question is to consider a generalization the Milgram-Segal design to accommodate the requirements of NPRM.

1. Spectrum Act 640A(2)(c) states that reverse auctions shall provide 3 bid options for participants such as going off the air, switching to the VHF band, and channel sharing.

2. The reverse auctions should take into account of the issue of coexistence and interferences with whitespace and other uses of spectrum.

12. Simultaneous Heuristic Auctions.

1. Bid collection procedures. Each bidder, for each relinquishment options, offers the payment that the buyer wishes to procure. Each station has 2 ways (going off the air or moving to the VHF band or staying on the air). The buyer wishes to procure goods. Each station has 2 ways (going off the air or moving to the VHF band) to relinquish the goods. Suppose there are 3 potential sellers.

2. Scoring procedures. In heuristic auctions, bids are evaluated with the scoring function. In the process of assignment, let \( A \) be the set of active bidders in the auction for the \( j \)-th option.

(a) In the auctions for going off the air, the scoring function checks interferences with already repacked stations at the UHF band. If there are interferences with existing UHF stations, then the score would be zero, the offer would be accepted, and the station would go off the air.

(b) In the auction for moving to the VHF band, the scoring function checks interferences with stations already assigned to the VHF band. If there are interferences with existing VHF stations, then the score would be high, the offer would not be accepted, and the station cannot be assigned to the VHF band.

(c) Furthermore, the feasibility checker examines consistence and interferences with whitespace and other uses of spectrum.

3. Auction phase: We conduct the heuristic auctions of Milgram and Segal (2013) for auctions for each option to determine the provisional winners and threshold prices for each auction.

4. Supplementary phase. If there are sellers who are provisional winners in multiple auctions, then the buyer buys through the option that provides the highest profit for the seller.

13. Example. The buyer wishes to procure goods. Each station has 2 ways (going off the air or moving to the VHF band) to relinquish the goods. Suppose there are 3 potential sellers.