

# **Spectrum Auction Design**

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## *Abstract*

Spectrum auctions are used by governments to assign and price licenses for wireless communications. The standard approach is the simultaneous ascending auction, in which many related lots are auctioned simultaneously in a sequence of rounds. I analyze the strengths and weaknesses of the approach with examples from US spectrum auctions. I then present a variation, the package clock auction, adopted by the UK, which addresses many of the problems of the simultaneous ascending auction while building on its strengths. The package clock auction is a simple dynamic auction in which bidders bid on packages of lots. Most importantly, the auction allows alternative technologies that require the spectrum to be organized in different ways to compete in a technology-neutral auction. In addition, the pricing rule and information policy are carefully tailored to mitigate gaming behavior. An activity rule based on revealed preference promotes price and assignment discovery throughout the clock stage of the auction. Truthful bidding is encouraged, which simplifies bidding and improves efficiency. Experimental tests and early auctions confirm the advantages of the approach.

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