

How Computer Science Informs Modern Auction Design *

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Over the last twenty years, computer science has relied on concepts borrowed from game theory and economics to reason about applications ranging from internet routing to real-time auctions for online advertising. More recently, ideas have increasingly flowed in the opposite direction, with concepts and techniques from computer science beginning to influence economic theory and practice.

In this lecture, we illustrate this point with a detailed case study of the 2016-2017 Federal Communications Commission incentive auction for repurposing wireless spectrum. Computer science techniques, ranging from algorithms for NP-hard problems to nondeterministic communication complexity, have played a critical role both in the design of the reverse auction (with the government procuring existing licenses from television broadcasters) and in the analysis of the forward auction (when the procured licenses sell to the highest bidder).

About the Speaker

Roughgarden is a professor of computer science and, by courtesy, management science and engineering at Stanford University. He joined the Stanford faculty in 2004, following a Ph.D. at Cornell University and a postdoc at the University of California, Berkeley. His research interests include the many connections between computer science and economics as well as the design, analysis, applications and limitations of algorithms. He has received the ACM Grace Murray Hopper Award, the Presidential Early Career Award for Scientists and Engineers (PECASE), the Kalai Prize in Computer Science and Game Theory, the Social Choice and Welfare Prize, the Mathematical Programming Society's Tucker Prize, and the EATCS-SIGACT Gödel Prize. His books include *Twenty Lectures on Algorithmic Game Theory* (2016) and *Algorithms Illuminated* (2017).

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