

# Multiagent decision-making and control

## Randomized feedback games

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## Course topics

- 1 Static games
- 2 Zero-sum games
- 3 Potential games
- 4 Extensive form games
- 5 Randomized strategies in extensive form games
- 6 Dynamic games, dynamic programming for games
- 7 Dynamic games, linear quadratic games
- 8 Convex games, Nash equilibria characterization
- 9 Convex games, Nash equilibria computation
- 10 Auctions
- 11 Bayesian games
- 12 Learning in games
- 13 Final project presentations

## Lecture outline

Today's lecture will be mainly on blackboard. I will upload detailed notes on Moodle. Meanwhile, the high-level concepts are put on slides here.

- Auctions motivation
- First-price and second-price auctions
- Multi-unit auction
- Vickrey-Clarke-Groves (VCG) auction mechanism

## Examples of auctions

still ongoing in the Netherlands



## Examples of auctions -art

### Christie's art auction



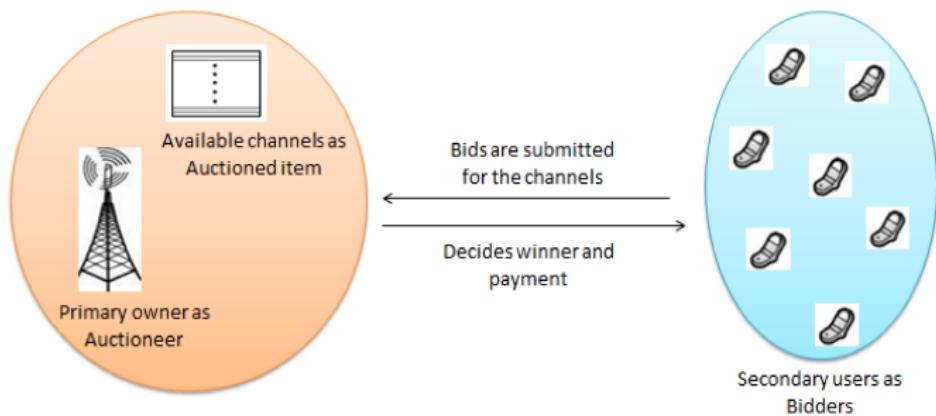
## Examples of auctions

### A fruit auction in 1957



## Examples of auctions

How some governments sell the rights to transmit signals over specific bands of the electromagnetic spectrum to companies



## Examples of auctions

How facebook, google and many other online platforms decides which ads are shown where/when



# The Facebook Ad Auction

What You Need to Know

## Our goal

- Formulate auctions as games
- Three specific auction mechanisms and properties of their equilibria
- Mechanism design and its challenges

## Next steps

- 1 See lecture notes posted on Moodle for background, proofs and references
- 2 Read the references provided for additional insights



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