



# Contracts and Auctions: Complementary or Competitive?

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# Outline

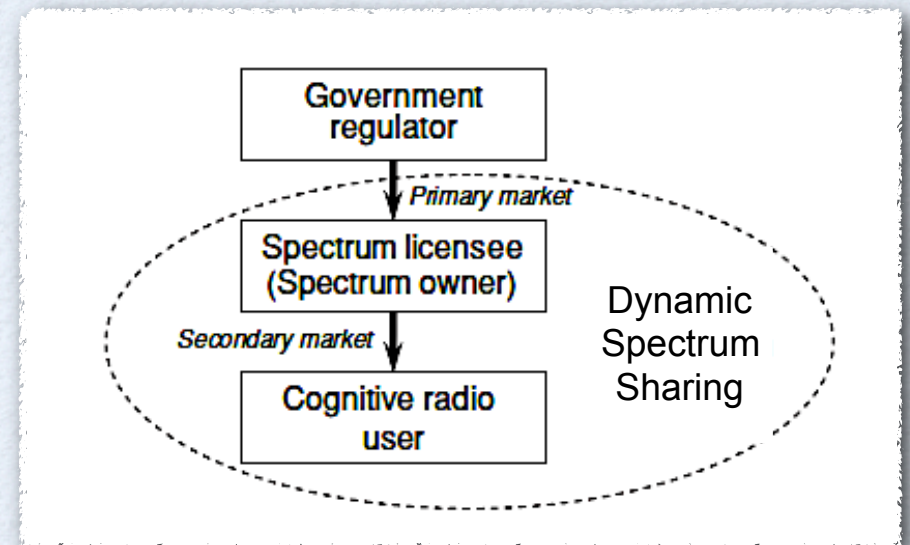
- Cognitive Radio
- Spectrum Trading
- Auction Designing - Spot Markets
- Contract Designing - Future Markets
- ContrAuction Designing
- Conclusion

# Cognitive Radio

- Background
  - Spectrum Scarcity & Inefficient Usage
- Functions
  - Sensing, Management, Sharing, Mobility, etc.
- Dynamic Spectrum Sharing
  - Technical: Efficiency & Interference
  - Economic: Incentive

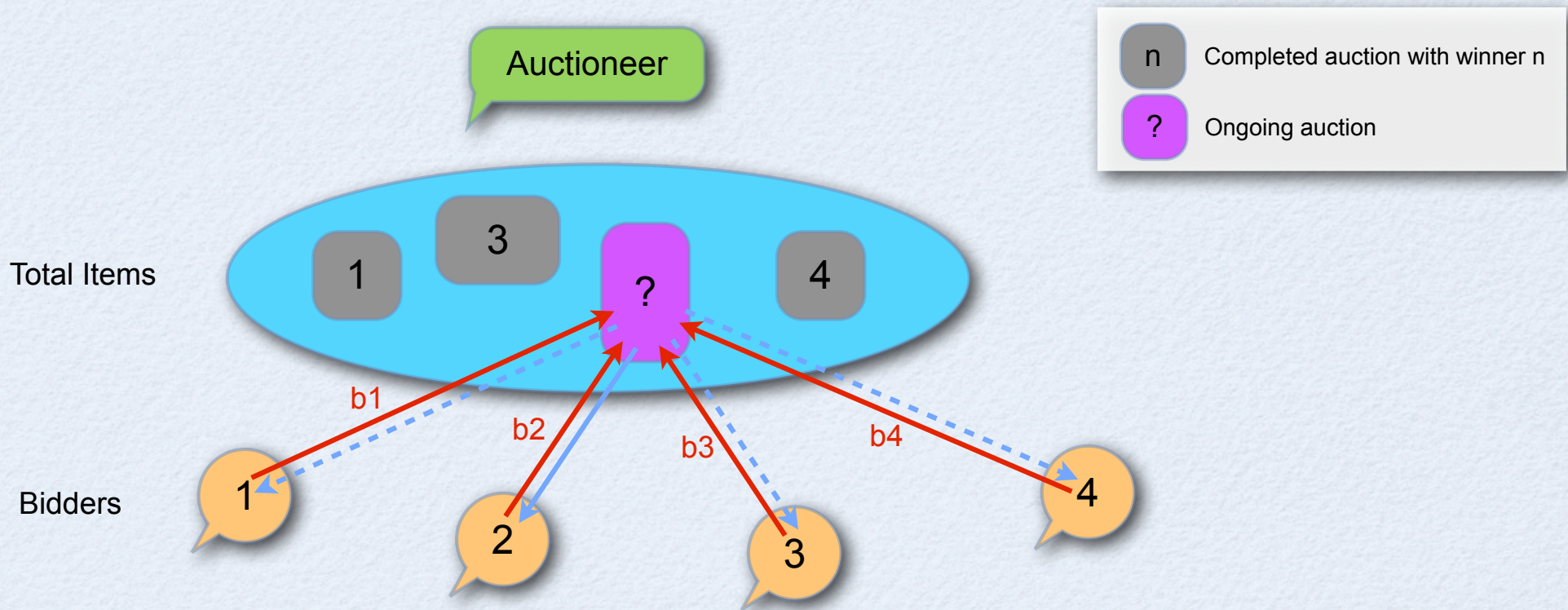
# Spectrum Trading

- Spectrum Secondary Market [Hossain, Niyato, Zhu Han]
  - Ensuring Incentive
  - Achieving Different Objectives
  - Mature Models in Economics
- Common Models
  - Auction
  - Contract



# Auction Designing

- Auction
  - Bidding/Pricing Mechanism
  - Assigning Mechanism

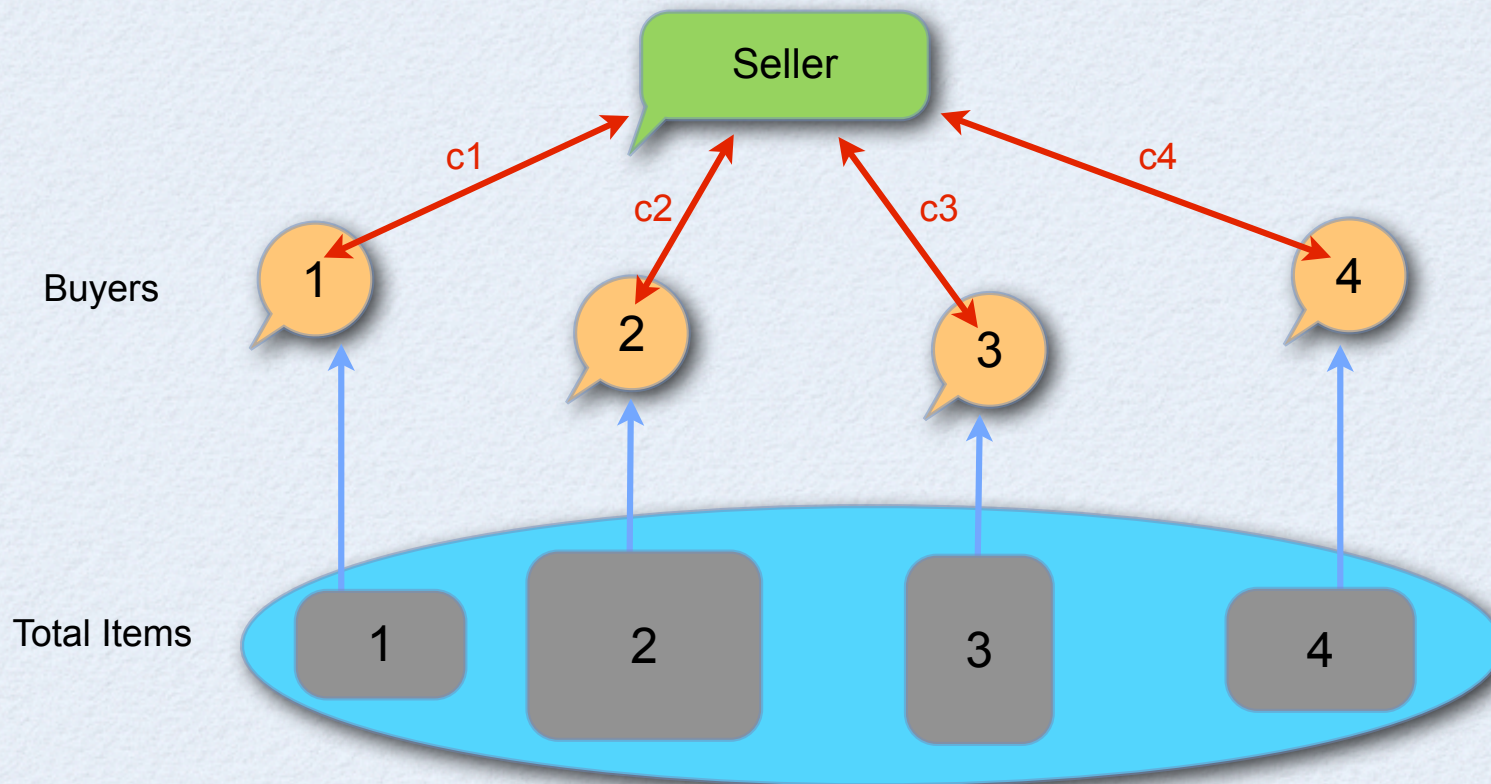


# Auction Designing

- Advantages
  - Seller: Revenue
  - Buyer: Incentive and Flexibility
  - System: Reflecting real-time market situation
- Disadvantages
  - Demand/Supply Uncertainty

# Contract Designing

- Contract
  - Agreement between Sellers and Buyers before actual trading and delivering



# Contract Designing

- Advantages

- Combating Demand/Supply Uncertainty
- Simplicity

- Disadvantages

- Low Revenue
- Low Flexibility



# Auction vs. Contract

- Auction vs. Contract
- Spot Market vs. Futures Market
  - Commodities are traded and delivered immediately according to the real-time bidding.
  - Commodities are traded according to standardized futures contracts, which specify the quantities, qualities and prices with delivery set at a specified time in the future.

# Auction vs. Contract

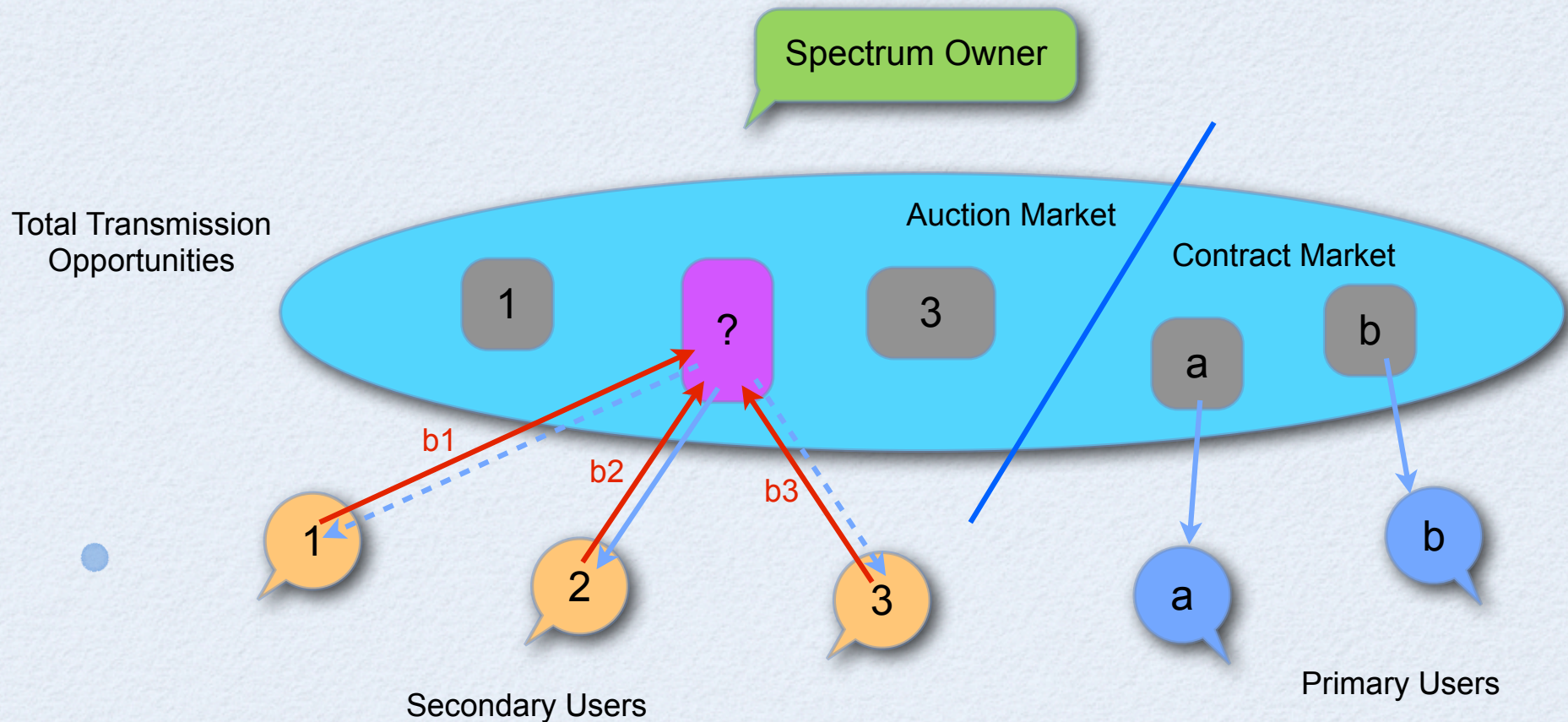


# ContrAuction Designing

- Hybrid Markets
  - Someone prefer Auction to obtain more flexibility.
  - Someone prefer Contract to combat future's demand and supply uncertainty.
- How to divide the total items among the auction market and contract market ?

# ContrAuction Designing

- A Simple Example in CR Networks

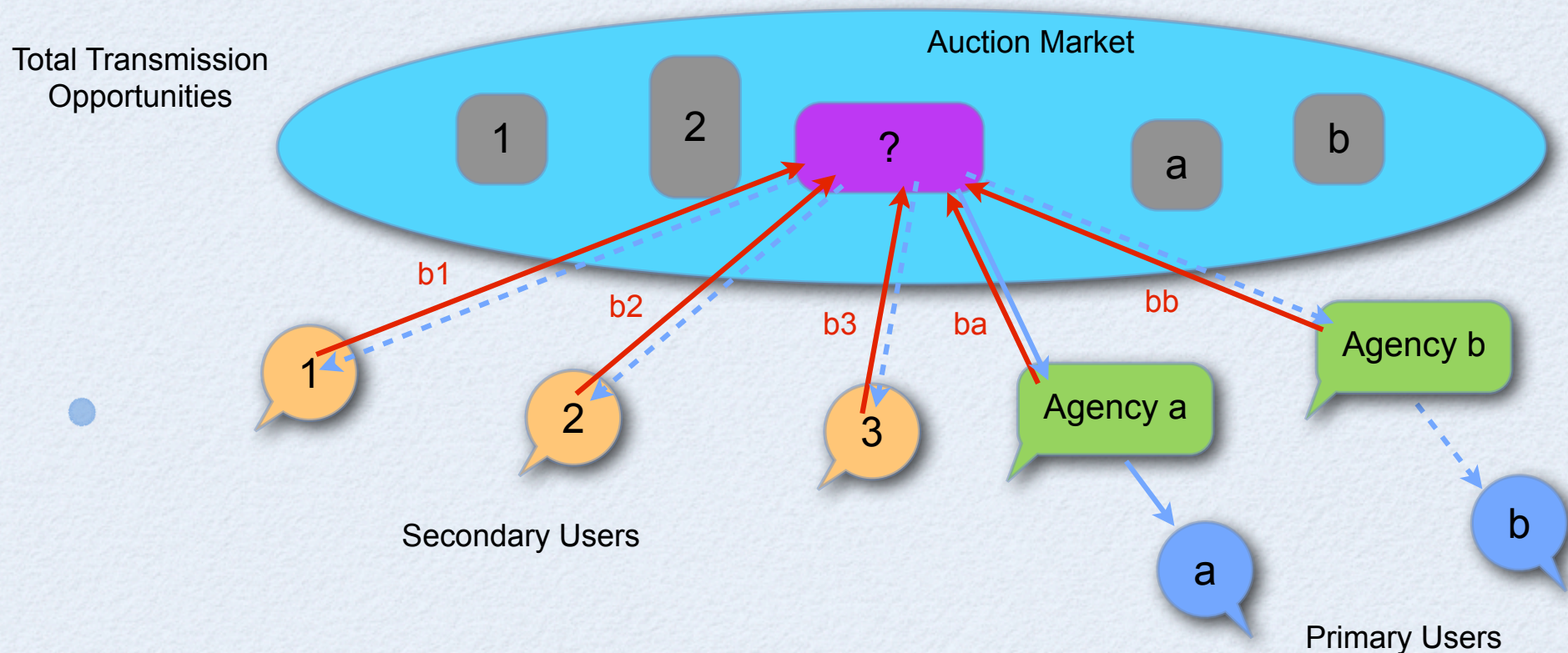


# ContrAuction Designing

- Solution I: Contract First
  - Allocating a fixed part of items to Contract market
  - Disadvantages: Low revenue
- Solution II: Contract Cheapest
  - Allocating the cheapest items to Contract market
  - Disadvantages: Low fairness
-

# ContrAuction Designing

- ContrAuction Designing
  - Basic Idea: the seller acts as bidding agencies, bidding on behalf of the contract buyers.



# ContrAuction Designing

- ContrAuction Mechanism
  - Dividing total items among auction market and contract market
  - Designing proper bidding strategy for agency to achieve the above division
- Objective
  - Fulfilling Revenue and Fairness requirement
  - Satisfying the Requirements of Contract Buyers

# Conclusion

- For the Hybrid Markets, we propose a ContrAuction mechanism in which the seller acts as an bidding agency on behalf of his contract buyers.



Q & A