Auctions for Airport Landing Slots The Bidder Problem

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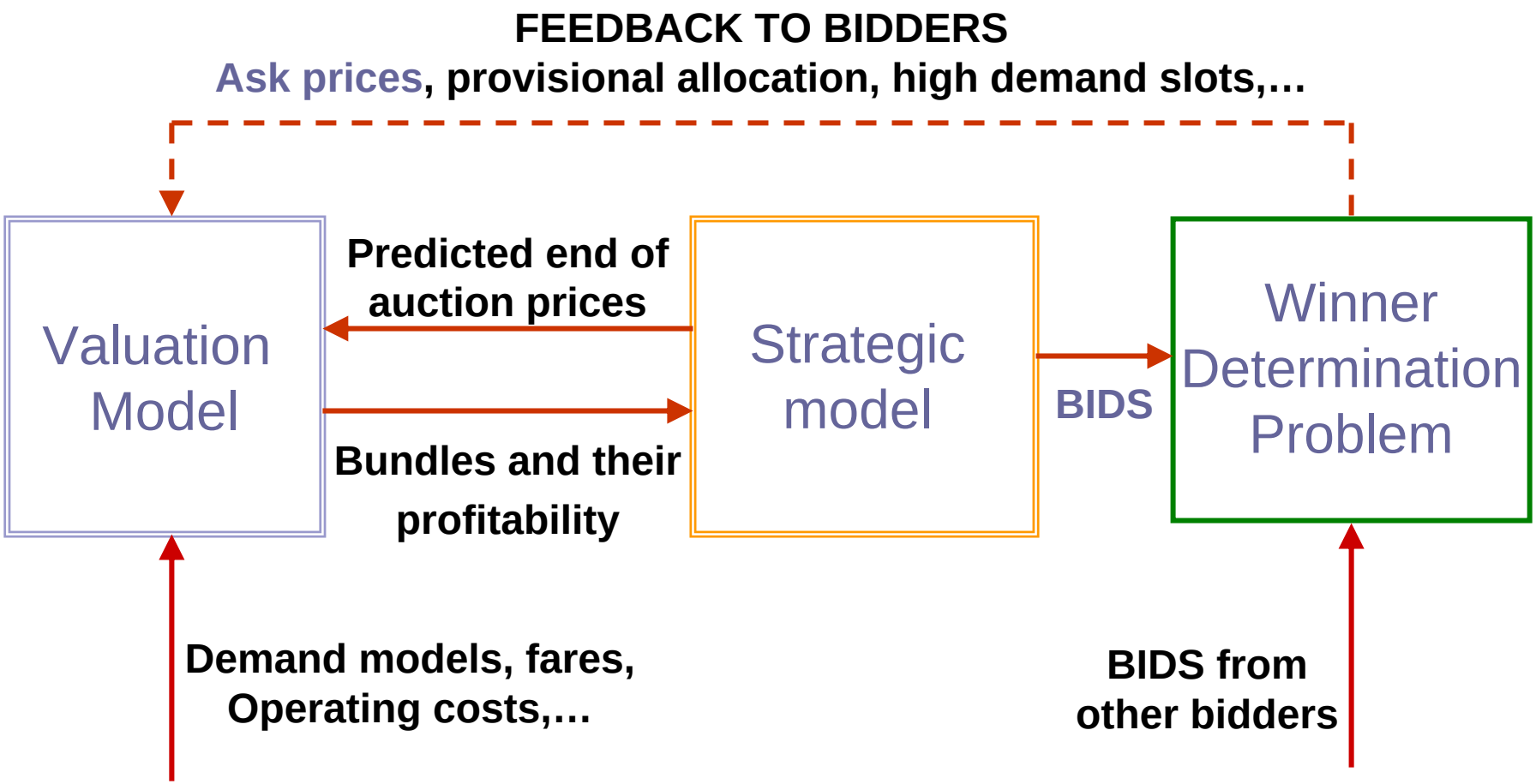
Motivation & Problem

- Efficient allocation of scarce resources in a network
- Airports are congested
  - Increasing demand for access
  - Capacity constraints
- La Guardia Airport (LGA) – Chronically congested
- Auctions – reallocate the scarce resources
  - Auctioneer: NY & NJ Port Authority? FAA?
  - Bidders: Airlines
  - Resources: Landing slots

Challenges

- Design an auction
- Understand potential airline response to the auction
- Construct a simulator to study the impact of the auction as well as compute the efficiency of the auction

Slot Auction Model



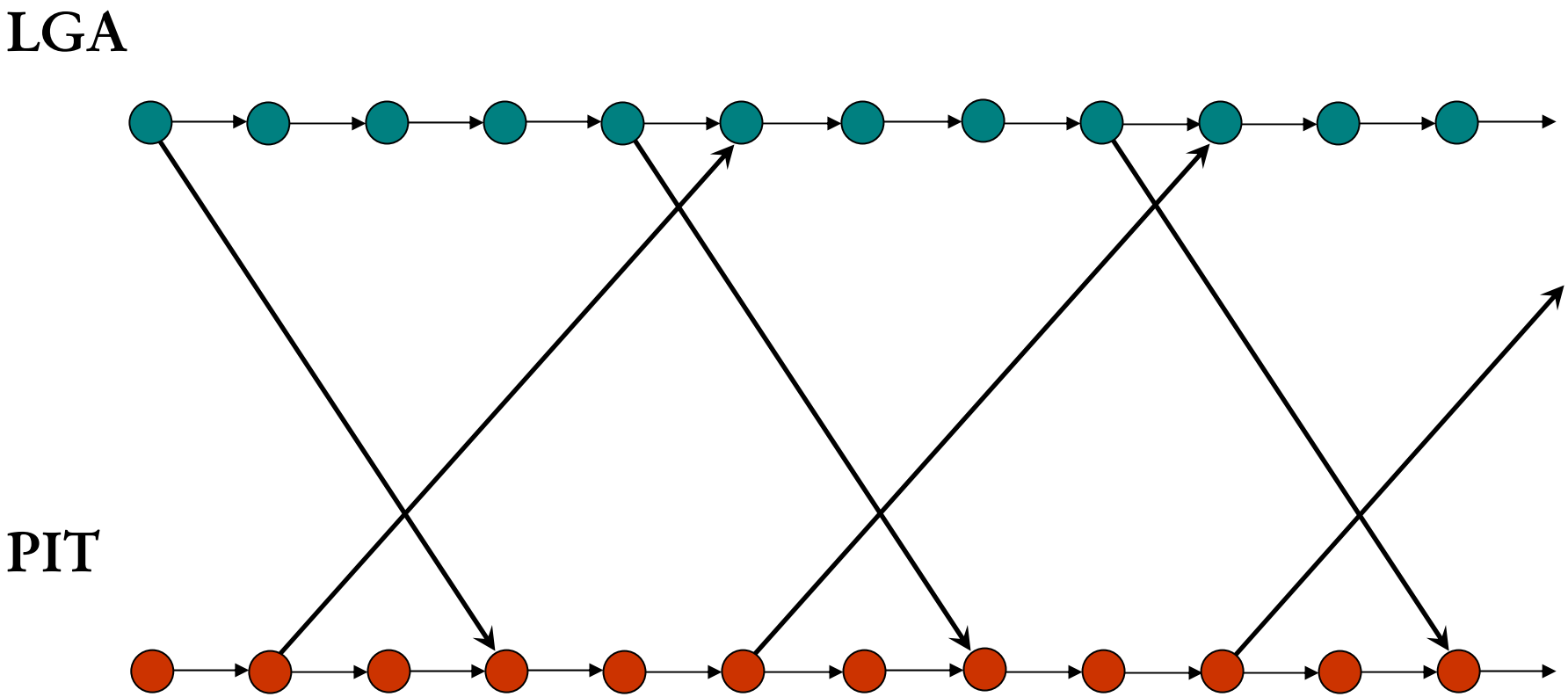
Valuation Model

- Plausible model for airline bidding/response
- Agents are assumed to have valuations independent of other agents
- Challenges: Exponential number of bundles, speed
- Decisions: Scheduling & fleeting decisions (network based model)

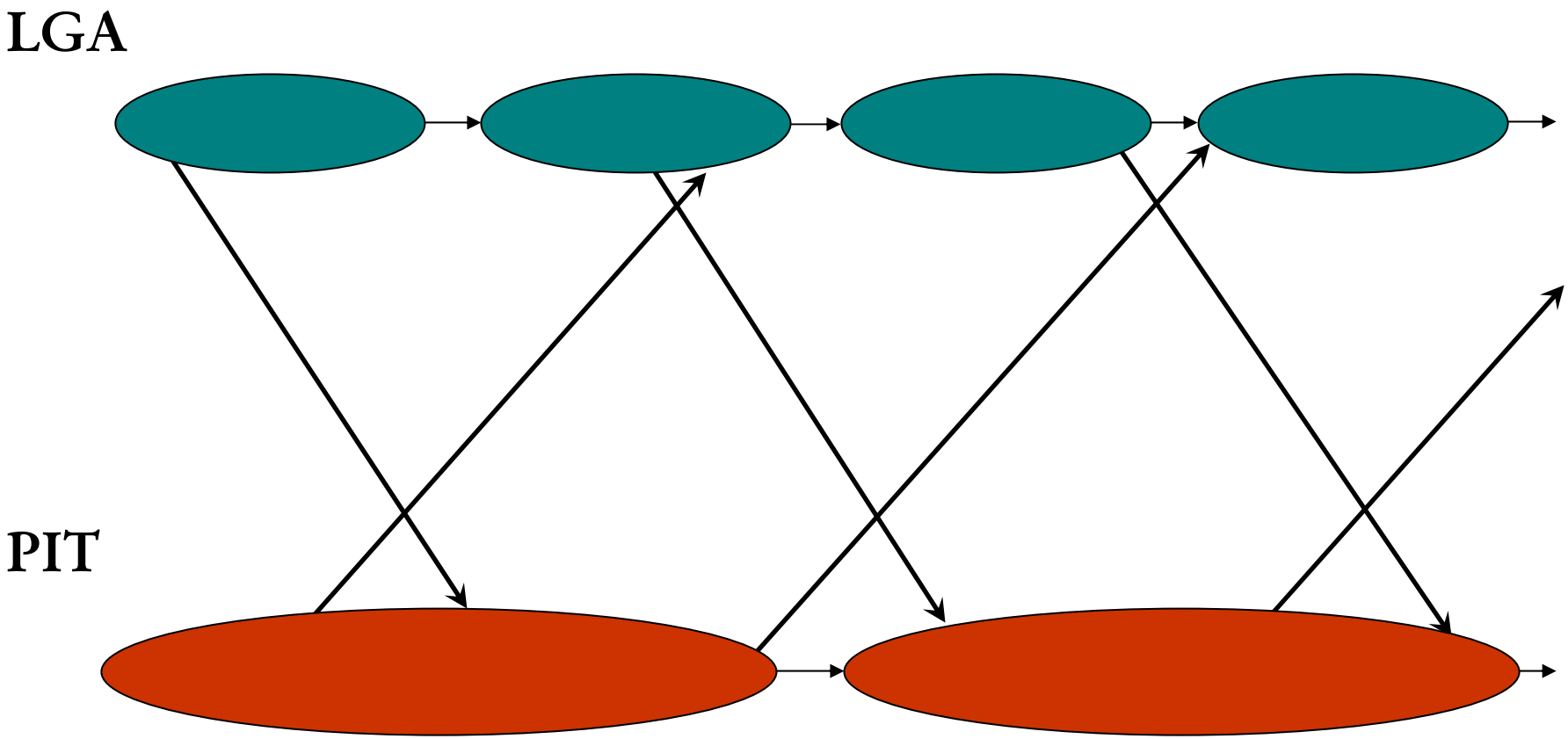
Our Approach

- Aggregated decision making over network
- Aggregated integrated airline schedule and fleet assignment model (AIASFAM)
- Leases of 5 years, data forecasts, markets & participants change

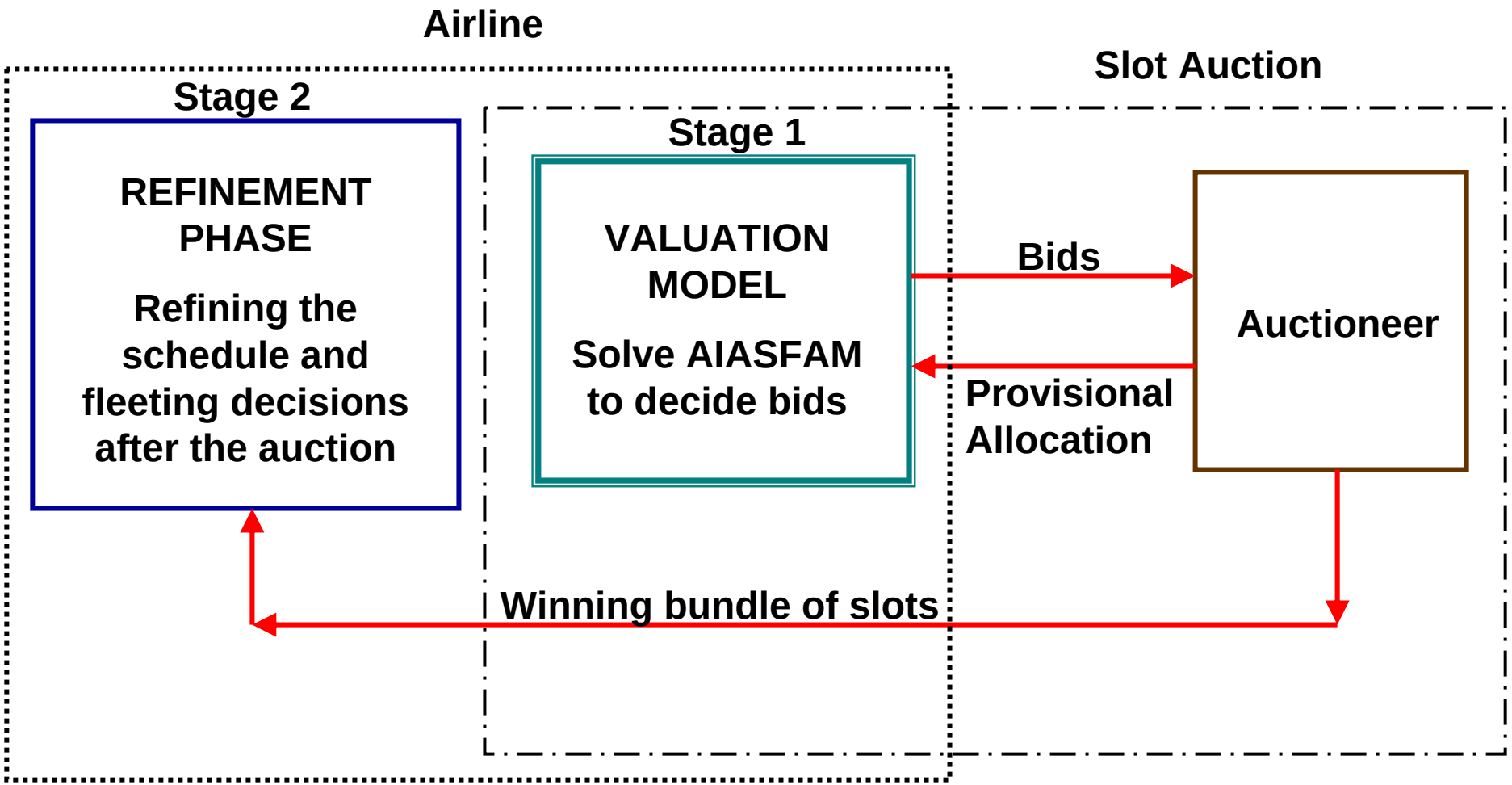
Time Space Network



Time Space Network



Airline Behavior



LGA Auction Simulator

- Integrates
  - Valuation model
  - Strategic model
  - Clock Proxy Auction (JAVA and CPLEX)
- Each auction begins by creating a new environment
- Preliminary Results
  - Small communities served by LGA eventually get eliminated
  - Cities connecting LGA are up-gauged
- Future work: Benchmarking the auction codes – Efficiency of the auction

Questions?