ISO Open system
Requirements and IT Needs

• Access to network monitoring data
• Access to relevant databases
• Ability to understand possible contingencies/risks/limits associated with particular energy transactions
• Coordination of maintenance schedules for improved generation as well as network availability and reliability
Maintenance Scheduling

Distributed information in a deregulated environment:

- GENCO: device info, schedules
- ISO: system info, reliability constrains
- TRANSCO: device info, schedules

Schedule ➔ response ➔ schedule ➔ response
Difficulties

• Distributed information (both geographically and organizationally) among multiple entities, needing frequent coordination

• Diverse ownership of the equipment, leading to different or contradictory goals

• Intensive communication and coordination among market participants, resulting in multiple iterations required for optimization
Requirement on New Method

• Heterogeneous system support
  • Interfacing different hardware, operating systems, protocols
  • integrating with the existing software systems
• Support of a flexible and extendable system structure
  • easy updating of the coordination algorithms
• Security support
  • providing secure communicate channels
  • enabling user authentication and authorization
Scheduling Using Mobile Agents

- Each GENCO is represented by a mobile agent
- The agent travels between the GENCO and the ISO to exchange information
- Agents can adjust their acts to adapt to the changed situation
- Different algorithms can be used to control the negotiation processes
The mobile agent solves the master problem at GENCO and then travels to ISO with the initial solution.

The mobile agent submits the solution at ISO and gets the Benders cuts if the solution is not feasible.

The mobile agent returns to GENCO with the cuts.

With the returned cuts, the agent solves the master problem at GENCO again to begin the next iteration.
Comparison

• Centralized systems
  • big burden on data transfer, difficult to keep the data synchronized and up-to-date
  • market participants may not want to expose some sensible info

• Remote method calls (RPC, CORBA, RMI)
  • a set of standard interfaces must be defined and agreed by all entities
  • difficult to use
Benefits

• Flexible system structure
  • less coupling among different systems
  • easy to integrate with heterogeneous systems

• Less human interference
  • mobile agents can act on behalf of the users

• Easy to implement
  • communication problems and security support are taken care of by mobile agent software