

Auctioning of Link Capacity



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April 1st, 2003



Introduction

■ Motivation

- Increased requirements on large bandwidth
- Adequate supply of network resources by competitive network providers
- An interest in dynamic bandwidth broker mechanism that can be flexibly applied to network resource allocation

■ Pricing mechanism: auction

- Merits: simplicity to determine market price and efficiency to achieve best market value.

Auction

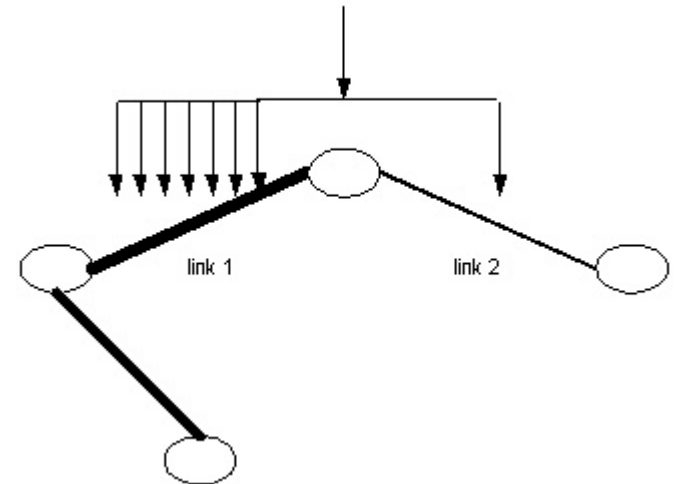
■ Typical types

- Ascending auction
- Descending auction
- Sealed bidding
- Open bidding
- Examples:

- English auction: open outcry, ascending auction
- Dutch auction: open descending auction

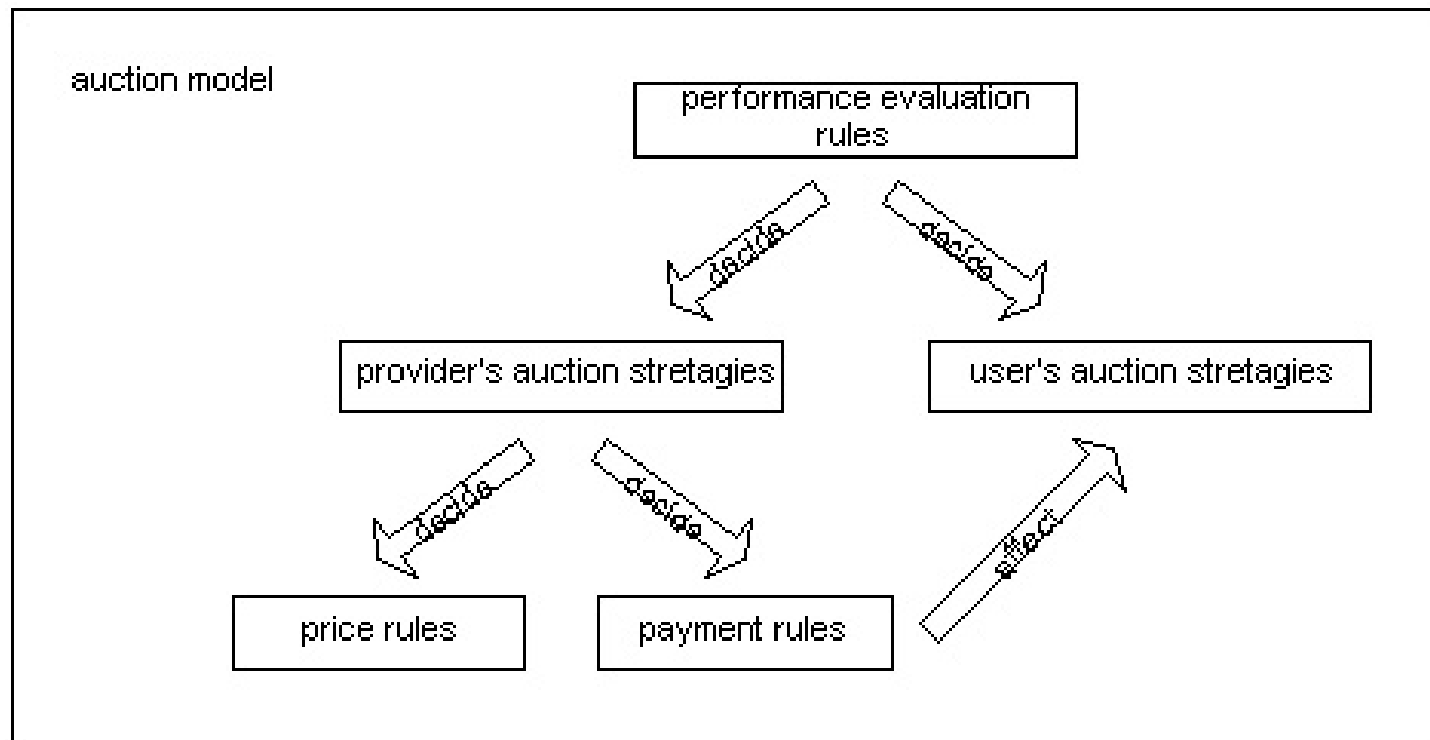
■ Auction for network resource allocation

- Offline auction: traditional methods
- Online auction: reexamined, improved hybrid methods



Issues

- Auction model
- Price rules of auction
- Payment rules of auction
- User auction strategies
- Provider auction strategies
- Performance evaluation rules





Related work - MIDAS

- Consists of a set of simultaneous multi-unit Dutch auctions, one per link.
- Users simultaneously bid for the quantity demanded at all relevant auctions in order to immediately allocate bandwidth.
- The bidders' strategies are based on the feedback on spare capacities and prices.
- A special feature of the MIDAS is the prices at various links are reduced at different rate for reflecting the different demand at different links.
- According to the experimental evaluation of two price reduction policies, the authors argued the efficiency of the mechanism in terms of social welfare associated with the resulting bandwidth allocation.



MIDAS – pricing reduction policies

- Variable reduction rates (VRR): Price reduction rate per link depends on spare capacity
 - Reduction rates of different links are ordered inversely that spare capacities
 - Faster decrease for lower demand
- Price freezing policy (PF): price per link reduces at fixed rate, but after an allocation occurs, the price “freezes” for time proportional to the size of the allocation
 - Price of different links are ordered inversely than spare capabilities except for periods of freezing



Proposal

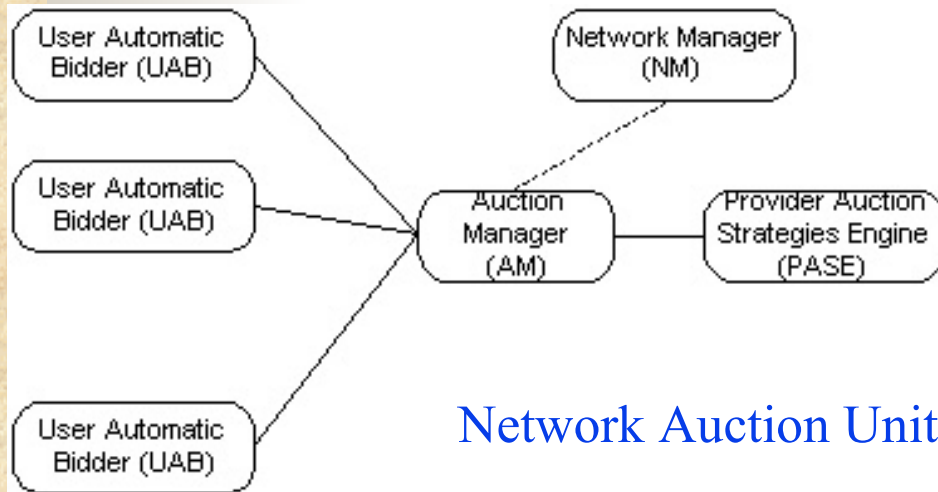
■ MIDAS

- Not a complete self-regulating solution dynamically changed according to demand and supply, only consider descending-price auction
- Did not consider how to apply it into networking mechanisms

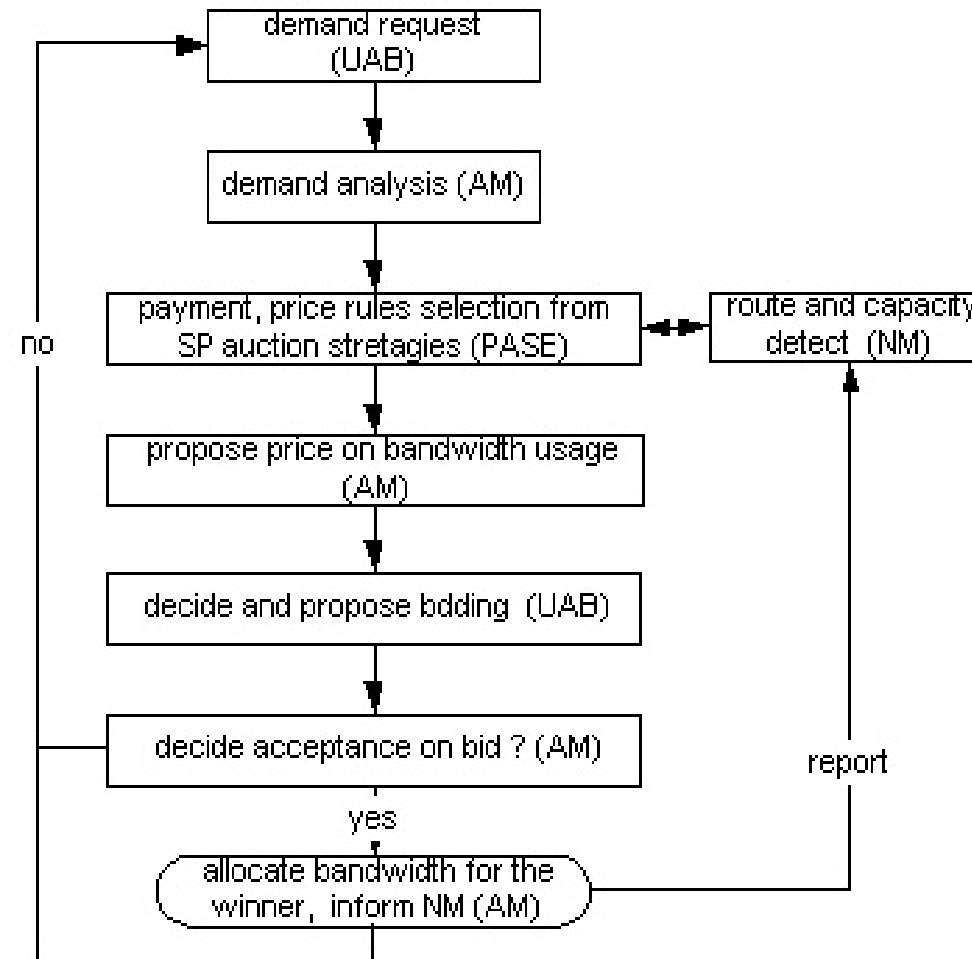
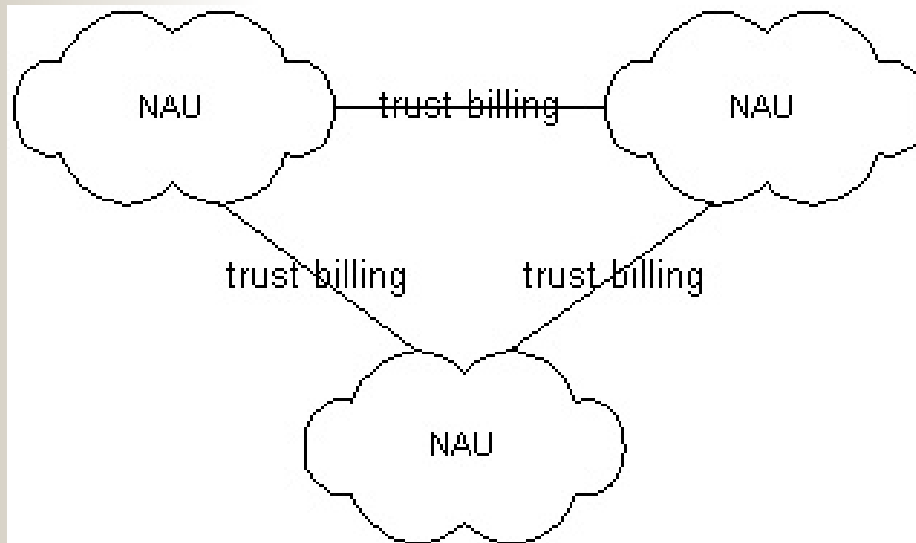
■ A self-regulating auction for intelligent routing in terms of the bandwidth allocation as an important aspect for achieving intelligence

- The existing study on the auctioning of link capacity is still based on the simple auction models. The network topology and capacity relationship are quite complicated.
- Lack a common self-regulating auction mechanism to manage and maintain the network resource that could benefit both the providers and the users in various scenarios.
- Establish a policy based automatic auction mechanism at the network decision point for intelligent network resources allocation.

Auction structure & procedure



Network Auction Unit





Discussion

- Questions on whether the proposal
 - worth studying
 - significant for intelligent network resource management
 - beneficial for both the users and providers
 - practical to be embedded into network routing and other mechanisms that are related to bandwidth allocation
- Other issues
 - Trust billing
 - Routing Embedment