

Creating label switched paths through an iterative combinatorial double-sided auction mechanism

Jun Shu

Department of Supply Chain & Information Systems

Penn State University

Smeal College of Business Administration

University Park, PA 16802-3008, USA

Abstract

We propose an iterative combinatorial double auction for trading resources in LSP (Label Switched Path) networks. Our goal is to let the market determine an efficient allocation of the resources, and decide a price under various equilibrium concept for each link of the network. In a multi-domain network, an end-to-end connection may traverse links that are operated by different owners. Such is the case of the Internet backbone. The current practice is for these owners to conduct secret bilateral negotiations. The resulting bilateral interconnection agreements produce the overall connectivity of the entire multi-domain network. Does there exist a more efficient approach than the secret bilateral negotiation? We think the answer is positive and set out to design an auction-based market approach to test our hypothesis. The items for auction are resource capacities over the links of the network. This paper treats bandwidth as the only resource. For different end-to-end connection paths, these items may be complementary or supplementary. Traders are owners of these links who may buy and sell capacities at the same time. The end result of the auction is twofold: An efficient allocation of the bandwidth to different traders, and an equilibrium price for each link. The auction is multi-round so as to allow for a more graceful price discovery process.

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