

Cooperative interdomain traffic engineering using Nash bargaining and decomposition

Gireesh Shrimali, Aditya Akella, Almir Mutapcic

We present a novel approach to interdomain traffic engineering based on the concepts of Nash bargaining and dual decomposition. Under this scheme, ISPs use an iterative procedure to jointly optimize a social cost function, referred to as the Nash product. We show that the global optimization problem can be separated into subproblems by introducing appropriate shadow prices on the interdomain flows. These subproblems can then be solved independently and in a decentralized manner by the individual ISPs. Our approach does not require the ISPs to share any sensitive internal information, such as network topology or link weights. More importantly, our approach is provably Pareto-efficient and fair. Therefore, we believe that our approach is highly amenable to adoption by ISPs when compared to past approaches. We also conduct simulation studies of our approach over several real ISP topologies. Our evaluation shows that the approach converges quickly, offers equitable performance improvements to ISPs, is significantly better than unilateral approaches (e.g., hot-potato routing) and offers the same performance as a centralized solution with full knowledge.

*To read the Full paper, please contact Arun_Kumar@isb.edu