Abstract

We study an implementation problem faced by a planner who can influence selfish behavior in a roadway network. It is commonly known that Nash equilibrium does not necessarily minimize the total latency on a network and that levying a tax on road users that is equal to the marginal congestion effect each user causes implements the optimal latency state. This holds however only under the assumption that taxes have no effect on the utility of the users. In this paper we consider taxes that satisfy the budget balance condition and that are therefore obtained using a money transfer among the network users. Hence at every stated the overall taxes imposed upon the users sums up to zero. We show that the optimal latency state can be guaranteed as a Nash equilibrium using a simple, easily computable transfer scheme that is obtained from a fixed matrix.

In addition, the resulting game remains a potential game and the levied tax on every edge is a function of its congestion.