An Incentive Mechanism for Reducing Congestion-Related Costs in Transportation Systems: A Pilot Program in India

Summary

The proposal outlines a general approach for influencing the behavior of commuters by incentivizing them to travel at times of low congestion. Our goal is to reduce congestion-related costs (fuel, pollution, time) and, ultimately, to reduce congestion itself.

At its core, the proposal concerns an incentive mechanism to change the commuting patterns of a large population of commuters who are part of a pilot program in Bangalore, India. However, our ideas are generalizable to a wider context; indeed, one of our main goals is to extend our pilot program to address congestion in Bangalore and elsewhere.

A salient feature of our approach is its use of ideas, such as congestion management, incentive mechanism design, and distributed measurement which have proved very effective in ensuring the simplicity and scalability of the Internet over the last two decades.

Our proposal addresses the Bangalore congestion problem. We begin by considering the specific problem of reducing the maddeningly long commutes to Electronic City by the IT community. Electronic City is located about 15 km south of Bangalore and hosts IT giants such as Infosys Technologies, Wipro, Hewlett Packard, Tata Consultancy Services, Siemens, Satyam Computers and Tata Power. An entity, called the Electronic City Industries Association (ELCIA), of which these companies are members, overseas the development of Electronic City. We have initiated a project with Infosys, with the aim extending it to all of ELCIA.

A persistent problem. Extensive and detailed data maintained by Infosys shows that commuters who leave for work after 7.30am suffer commute times that are **1.5 times longer** when compared with those who leave before 7.30am. This translates to any extra 45–60 mins extra commute time every day! In addition there is the cost of pollution due to emissions and noise, and the cost of extra fuel. The huge time and fuel costs haven't deterred commuters.

Incentive mechanism. In order to unilaterally incentivize commuters to arrive early, we have proposed an incentive scheme whereby those who come late pay a very small "charge" and the total collection of charges is given away to those who come early in the form of "rewards." This method is a **zero sum game**, similar in spirit to Carbon Credits and to Congestion Pricing in the Internet. Basically, those commuters who are "in-profile" (arrive early) collect money from those who are "out-of-profile." Over the long term, the *incentive compatible* nature of the scheme will have the effect of shifting more commuters to earlier arrival times.

Energy efficiency significance. Reducing fuel consumption due to traffic congestion has a direct impact on on energy efficiency. Methods include decongesting, encouraging carpooling, encouraging better utilization of vehicles so that the number of vehicles can be reduced.

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