



INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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SHORT ABSTRACT

One of the most important inventions, which has revolutionized the way of living and working of people, is the internet. The increase in internet coverage and the decrease in internet access price has resulted in demand for a good internet service. Clients want some guarantee in internet access quality. In this thesis, we present a model in which clients are guaranteed connection and bandwidth and if clients do not get the service they request, the service provider pays a penalty to the clients. We consider a system where each client has access to multiple internet service providers (ISP) and can choose one of them to connect to based on the prices being offered by the ISPs. When a client arrives, an ISP has to decide whether to accept the client, and the price to charge from the client for the duration of its connection. Rejection of a client results in a penalty and delay in getting requested bandwidth while connected also incurs a penalty. We assume a Poisson arrival process with the rate of arrival sensitive to the price being charged. While connected, a client sometimes remain idle and sometimes consumes bandwidth; and both these durations are exponentially distributed. A service provider tries to maximize its income by charging appropriate prices based on its current state and deciding whether to accept more clients or not. Since penalties are imposed, such solutions also automatically balance load among service providers, and so the quality of service to clients improves. We first present a solution to obtain Nash equilibrium between two ISPs. We then present a solution that maximizes the steady state income of service providers. As the computational complexity of this solution is high, we propose two approximate solutions. The solutions are then compared using simulation. Simulation results show that our solutions, including the approximate solutions, significantly improve quality of service of clients and increase the income of service providers as compared to a simple heuristic based solution that otherwise could to be used.