DIAL-UP INTERNET ACCESS MARKET ANALYSIS BY ECONOMIC ENGINEERING MODELING AND SIMULATION

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Abstract

In this paper, we study the local, dial-up Internet access market using a game theoretic modeling and its simulation. In particular, we consider the Nash equilibrium of the service providers and examine their behavior on investment and output level. We calibrate this model to fit the industry structure and data found in local markets. In the first part of the paper, we examine the Internet industry structure and its characteristics focusing on dial-up access technology. In the latter part, we create Cournot duopoly model of the Internet access market, in which real world cost and revenue projection will be used to find an Internet access market equilibrium and its social welfare. This model and output will be evaluated by a simulation approach with a random number generator. These analyses allow us to explain the motivation for the ISPs' behavior, such as over-subscription and under-investment. Finally, we will present an analytical framework for the Internet industry policy maker.

Key Word: Internet Industry, Game Theory, Simulation,
JEL code: C72, D21, D60, L86, L96

1. Introduction

It is well known that the cost characteristics of Internet capacity provisioning include large, up front sunk costs and near zero short run marginal cost of traffic. Another well-known characteristic of Internet industry is that the Internet dial-up access product is almost homogeneous. These two features are significant determinants in the analysis of the Internet industry.

ISPs (Internet Service Providers) in this industry are competitors and cooperators simultaneously: On one hand they are competitors for their market shares but on the other they are cooperators that provide universal, global connectivity, that is to say, one ISP's decision has an influence to other ISP's decision. Therefore, ISPs in the Internet industry have a strong dependence with each other. This unique characteristics make the Internet suitable to game theoretic situation, i.e., each player in the game model is a competitor in a market and there are interactions according to their strategic decision.

There are many ISPs in the access market, most of which are concentrated on urban metropolitan area. Some of them are big companies and they are equipped with financial power and high level of technology, but many of them are small-sized, family-operated, rural ISPs. From the universal connectivity point of view, they are very important to give Internet accessibility to a whole nation. Our model in this paper will focus on small ISPs in the rural area.

With the above assumptions, we can apply the Cournot duopoly model to ISPs in the rural downstream market and conduct a simulation with a RNG (random number generator) to evaluate the theoretical model. The research purpose in this paper is to provide to the Internet industry policy makers a framework that they have to take a consideration for small, rural ISPs when they make a future Internet industry policy.

[Bibliography]

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