Issues in pricing internet services

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Abstract

One of the critical challenges facing the telecommunications industry today is to increase the profitability for Internet service providers. For historical reasons, the current Internet protocol stack lacks basic features needed to implement efficient economic mechanisms. Consequently, the providers have limited economic incentives to invest in new technology for value-added services. This results in a stagnant industry and limits the evolution of the Internet.

In this talk, we present pricing schemes that would enable the providers to profit from offering differentiated services and share the increased revenues fairly. We first show that with the commonly accepted Differentiated Services model, if prices are not properly differentiated with respect to service quality, then the system may settle into either unstable or inefficient equilibria. We then discuss how to construct pricing schemes that are stable and lead to socially optimal allocation among users.

Pricing issues become more complex when a service needs to be jointly provided by a network of providers. We first show that if providers are allowed to charge freely in their own interest, then the resulting equilibrium could be inefficient, unfair and may discourage future upgrades to the networks. As an alternative, a simple revenue-sharing policy, under which providers would agree to collaborate for increasing their revenues, can be shown to eliminates all the aforementioned drawbacks. For its implementation, a protocol is constructed based on the predicted outcome of the game, so that providers do not

have incentive to cheat. We construct a decentralized algorithm that the providers can use to compute the optimal prices and show that the algorithm is scalable and converges to the improved equilibrium.

Joint work with Linhai He.