An Internet Cost Model, Assignment of Costs Based on Actual Network Use

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ABSTRACT

In a transforming, complex, and innovating telecommunications industry with evolving business models, providers have to resolve how the pricing of their services in a context with many unknowns and few equations. This paper proposes a cost assignment model based on differentiating the set of required services a user consumes in a granular network architecture, to get a requested content. Unlike the flat rate model, this model is focused on obtaining a variable pricing methodology that reflects the actual use of network resources that users utilize to get specific content. There are exploring elements to establish the importance of this topic; the theoretical models of pricing are reviewed, the complexity of the costing issue and the influence of content providers on the real network operating cost are explored. Also, a precise cost model is proposed, as well as some cases of the application of the model in the real world.

Keywords: Cost Model, Future Internet, Internet Cost, Internet Pricing, Service Composing

INTRODUCTION

An Industry in Transformation

The “one system, one policy, universal service” method that Theodore Vail managed to impose in the origins of telecommunications is known today as Internet, a system of great complexity which has remained as a unique and universal scale service that has transformed one of the most dynamic markets in the world.

Internet provides an unprecedented convergence of services and has also added new players to the market, who have gained dominant positions and prevailed over classical operators. For the operators, the fact of being the physical network owners has not only given them an absolute advantage, but also the responsibility of keeping up the investments for the progressive development of a new generation of networks.
The proliferation of new business practices, such as new ways of network administration, prioritization, pricing, or strategic partnerships, suggests that the nature of the competence is changing, according to the maturity of the industry. It is argued that network neutrality and other proposals to restrict such practices have the risk of diverting the industry from its natural evolution path, while others claim the network neutrality has to be something sacred and must be a distinct market (Crowcroft, 2007; Yoo, 2010a).

In the U.S. as in Europe, as a part of the 2020 digital agenda, studies to re-design the Internet Protocol, from scratch or evolutionarily, are sponsored. The acceleration of innovation and the rupturistic way in which new services appear on the Internet are a challenge, not only for public policies but also for the network architecture itself. The proliferation of Video Over IP Services, wireless broadband, cloud computing, programmable networks, sensors networks, and in general how people use the network, may require the Internet to be developed in new ways (Yoo, 2010b).

**Infrastructure Investment’s Sustainability**

Network operators with own infrastructure face a double challenge: the relative drop of prices and the continuous increase of bandwidth requested by users who consume more and more multimedia applications. The case par excellence is on TV over IP (IPTV), a service that provides multimedia content in real-time and high quality, whose performance is linked to the network conditions and particularly to a bandwidth that allows avoiding high rates of packet loss (Yuh-Chung, Chin-Shiuh, Bin-Yih, Wei-Lun, & Jui-Fang, 2010). The required investments to maintain the bandwidth growth can come from an increase in use of the existing services, an increasing of the number of users that employ new services, or the increasing in productivity-innovation by firms. A combination of these options will be the formula to support and develop the operators’ business model.

The costs of an operator are known through financial statements that reflect the investments in equipment, software licenses, buildings, energy, personnel, advertising, amortization, etc., with a high degree of precision: the accounting precision. With this information it is possible to know the average cost per user, but to attribute a single user with the real cost, it is necessary to measure the use of network resources generated by that user. One option is to measure the volume of data exchanged with the network by each user; in fact, in mobile networks with Internet access, there are established limits of use at certain fees which, if exceeded, cause an extra cost to the user per amount of transferred data.

At this point, it is necessary to reflect on the dispute between Internet Operators, which essentially provide connectivity through their infrastructure, and the Final Service Providers and Content Providers, who base their business model on the infrastructure of others without investing in it. Therefore, it is important to note how the network interconnection is made between Interconnecting Providers, and how a Content Provider accesses the network.

The proposal exposed in this paper consists in associating the requests of the users to the services they consume; access to a television program, a telephone conversation, or the transmission from a sensor to a data collection center, would be examples of those services. This kind of services will be called *Composed Services* (CS), and will be considered as result of the union of *Atomic Services* (AS). Address resolution, coding, encryption, or the use of a particular bandwidth in an interconnection link, are examples of AS, which are resources that, together, constitute a CS that can respond to a user’s *Service Request*. The knowledge about the user’s navigation data, the CSs used and the ASs employed, would allow assigning each user a more accurate cost. The same model would serve to distribute the costs of the traffic between operators in a more fair way.
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