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Different Pricing Schemes for Communication Networks

N.ARAVIND KUMAR
Asst.Professor, Department Of CSE
MLR Institute Of Technology
Dundigal,Hyderabad,TS
Email id:aravind.n1205@gmail.com

MD.ANISH PASHA
M.Tech SE 2nd yr(13R21D2508)
MLR Institute Of Technology
Dundigal,Hyderabad,TS
anish.pasha786@gmail.com

ABSTRACT

The service supplier is aware of the utility operate of every user (thus complete information), we discover that the entire value differentiation theme can do an over sized revenue gain (e.g., 50%) compared to no value differentiation, once the entire network resource is comparably restricted and therefore the high-willingness-to-pay users are minorities. However, the entire value differentiation theme could result in a high implementation quality. To trade off the revenue against the implementation complexity; we tend to any study the partial value differentiation theme and style a polynomial-time formula which will cipher the best partial differentiation costs. We tend to additionally think about the unfinished data case wherever the service supplier doesn't understand to that cluster every user belongs. The revenue maximization problem of service provider is considered and different pricing schemes to solve the above problem are implemented. The service provider can choose an apt pricing scheme subjected to limited resources, if he knows the utility function and identity of the user. The complete price differentiation can achieve a large revenue gain but has high implementation complexity. We show that it is still possible to realize price differentiation under this scenario, and provide the sufficient and necessary condition under which an incentive compatible differentiation scheme can achieve the same revenue as under complete information.

Index Terms— revenue gain; price differentiation; pricing schemes

I. INTRODUCTION

Pricing plays a key role in management of networks [1]. It also used for design and operation of networks. Many sophisticated pricing mechanisms to extract surpluses from the consumers and maximize revenue (or profits) for the providers have been proposed. A typical example is the optimal nonlinear pricing.

Pricing has been used with two different meanings in the area of communication networks. One is the “optimization-oriented” pricing for network resource allocation: it is made popular by Kelly’s seminal work on network congestion control [14]. The “optimization oriented” rating for network resource allocation: it's created standard by Kelly’s seminal work on network congestion control. As an example, the Transmission management Protocol (TCP) has been with success reverse-engineered as a congestion pricing-based resolution to a network improvement downside [3]. An additional general framework of Network Utility Maximization (NUM) was later on developed to forward-engineer several new network protocols. In varied NUM formulations, the “optimization-oriented” costs typically represent the Lagrangian multipliers of assorted resource constraints and square measure won’t to coordinate totally different network entities [15] to realize the utmost system performance during a distributed fashion [13].

The other is that the “economics-based” rating, that is employed by a network service supplier to numerous objectives as well as revenue maximization. The right style of such a rating becomes notably difficult these days owing to the exponential growth of knowledge volume and applications in each wire line and wireless networks [4].

During this paper, we have a tendency to concentrate on learning the "economics-based" rating schemes for managing communication networks. Economists have projected several subtle rating mechanisms to extract surpluses from the shoppers and maximize revenue (or profits) for the suppliers. A typical example is that the best nonlinear pricing. In apply; however, we frequently observe straightforward rating schemes deployed by the service suppliers. Typical examples embrace flat-fee rating and (piecewise) linear usage-based rating. One potential reason behind the gap between "theory" and "practice" is that the best rating schemes derived in political economy typically contains high implementation complexness. The service provider wants to maximize its revenue by setting the right pricing scheme to induce desirable demands from users. Since the service provider has a limited total resource, it must guarantee that the total demand from users is no larger than what it can supply [7]. The details of pricing schemes depend on the information structure of the service provider. Under complete information, since the service provider can distinguish different groups of users, it announces the pricing and the admission control decisions to different groups of users. Main contributions are as follows.

• Complete network information: We propose a polynomial algorithm to compute the optimal solution of the partial price differentiation problem, which includes the complete price differentiation scheme and the single pricing scheme as special cases. The optimal solution has a threshold structure, which allocates positive resources to high willingness to pay users with priorities.

• Revenue gain under the complete network information: Compared to the single pricing scheme, we identify the two important factors behind the revenue increase of the (complete and partial) price differentiation schemes: the differentiation gain and the effective market size. The revenue gain is the most significant when high users are minority among the whole population and total resource is limited but not too small.

• Incomplete network information: We design an incentive compatible scheme with the goal to achieve the same maximum revenue that can be achieved with the complete information. We find that if the difference of willingness to pays of users are larger than some thresholds; this incentive-compatible scheme can achieve the same maximum revenue. We further characterize the necessary and sufficient condition for the thresholds.

II. RELATED WORK

A model to study the important role of time-preference in network pricing has been presented in. In the model presented, each user chooses his access time based on his preference, the congestion level, and the price that he would be charged. Without pricing, the "price of anarchy" (POA) can be arbitrarily bad. The authors then derived a simple pricing scheme to maximize the social welfare. From the SP's viewpoint, the authors considered the revenue maximizing pricing strategy and its effect on the social welfare [11] [6]. The authors showed that if the SP can differentiate its prices over different users and times, the maximal revenue can be achieved, as well as the maximal social welfare. However, if the SP had insufficient information about the users and can only differentiate its prices over the access times, then the resulting social welfare, especially when there are many low-utility users, can be much less than the optimum [12]. Otherwise, the difference is bounded and less significant.

A flat-fee pricing scheme where the payment does not depend on the resource consumption, here we study the revenue maximization problem with the linear usage-based pricing schemes, where a user's total payment is linearly proportional to allocated resource [8]. Existing work does not achieve the below things1) How to design simple pricing schemes to achieve the best tradeoff between complexity and performance? 2) How does the network information structure impact the design of pricing schemes?

In the communication network pricing literature, it is the linear pricing schemes that have been largely adopted as the means of controlling network usage or generating profits for network service providers. In, the authors extended the framework mentioned above to non-linear pricing and investigated optimal nonlinear pricing policy design for a monopolistic service provider [2]. The problem was formulated as an incentive-design problem, and incentive (pricing) policies were obtained for a many-users regime, which enabled the service provider to approach arbitrarily close to Pareto optimal solutions.

III PROPOSED SYSTEM:

In this paper, we focus on studying the "economics-based" pricing schemes for managing communication networks. Economists have proposed many sophisticated pricing mechanisms to extract surpluses from the consumers and maximize revenue (or profits) for the providers. A typical example is the optimal nonlinear pricing. In practice, however, we often observe simple pricing schemes deployed by the service providers. Typical examples include flat-fee pricing and (piecewise) linear usage-based pricing. One potential reason behind the gap between "theory" and "practice" is that the optimal pricing scheme derived in economics often has a high implementation complexity. Besides a higher maintenance cost, complex pricing schemes are not "customer friendly" and discourage customers from using the services. Furthermore, achieving the highest possible revenue often with complicated pricing schemes requires knowing the information (Identity and preference) of each customer, which can be challenging in large scale communication networks.

The partial price differentiation problem includes complete price differentiation scheme and single pricing scheme as special cases. The optimal solution to partial price differentiation problem is found out. The differentiation gain and the effective market size are the two important factors behind the revenue increase of price differentiation schemes. A network with a total amount of S limited resource is considered. The resource can be in the form of rate, bandwidth, power, time slot, etc. The monopolistic service provider allocates the resource to a set I = {1, . . . , I} of user groups. Each group i ∈ I has Ni homogeneous users with the same utility function: $u_i(s_i) = \Theta_i \ln(1 + s_i)$ Where si is the allocated resource to one user in group i and Θ_i represents the willingness to pay of group i. It is assumed that $\Theta_1 > \Theta_2 > \ldots > \Theta_I$. Since the service provider has a limited total resource, it must guarantee that the total demand from users is no larger than what it can supply. The details of pricing schemes depend on the information structure of the service provider.

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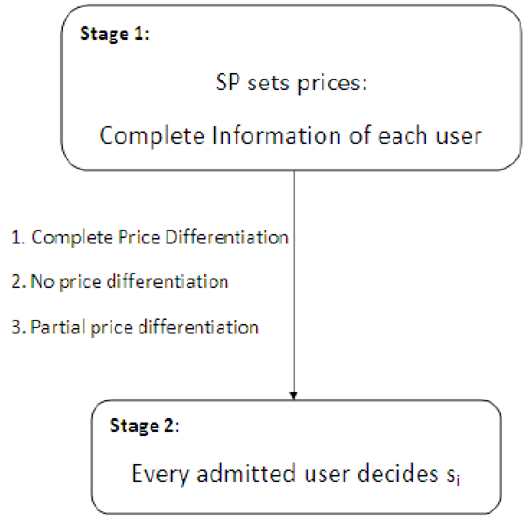

The service provider declares the pricing schemes in
Stage 1 and users interact with their demands in Stage 2. The users demand to maximize their surplus by optimizing their claim according to the pricing scheme. The service provider maximizes his revenue by making available a right pricing scheme to users.

Distinct Pricing Method

We have a tendency to showed that the CP theme is that the optimum rating theme to maximize the revenue below complete data. However, such a sophisticated rating theme is of high implementation quality. During this section, we have a tendency to study the only rating theme. It's clear that the theme can normally suffer a revenue loss compared to the CP theme. We'll attempt to characterize the impact of varied system parameters on such revenue loss.

A. downside Formulation and resolution

Let us 1st formulate the only rating SP downside Compared to the matter here the service provider charges one worth to any or all teams of users. When the same transformation as, we are able to show that the optimum single worth satisfies the subsequent the weighted water-filling condition.

Algorithm: Search the threshold of the SP problem

function $SP(\{N_i, \theta_i\}_{i \in \mathcal{I}}, S)$
  $Sk \leftarrow I,\ p(k) \leftarrow \frac{\sum_{i=1}^{k} N_i \theta_i}{S + \sum_{i=1}^{k} N_i}$
  while $\theta_k \le p(k)$ **do**
    $k \leftarrow k - 1,\ p(k) \leftarrow \frac{\sum_{i=1}^{k} N_i \theta_i}{S + \sum_{i=1}^{k} N_i}$
  end while
  $K^{SP} \leftarrow k,\ p^* \leftarrow p(k)$
  return K^{SP}, p^*
end function

Conclusion

In this paper, we proposed a tendency to study the revenue-maximizing drawback for a monopoly service supplier below each complete and incomplete network data. Below complete data, our focus is to analyze the trade-off between the whole revenue and therefore the implementation quality (measured within the variety of evaluation decisions on the market for users). The partial price differentiation is the most general one and includes the other two as special cases. By exploiting the unique problem structure, we designed an algorithm that computes the optimal partial pricing scheme in polynomial time, and numerically quantize the tradeoff between implementation complexity and total revenue. An algorithm that computes the optimal partial pricing scheme in polynomial time, and numerically quantizes the trade-off between implementation complexity and total revenue has been designed.

REFERENCES

[1] S. Shakkottai, R. Srikant, A. Ozdaglar, and D. Acemoglu, "The Price of Simplicity," IEEE Journal on Selected Areas in Communications, vol. 26, no. 7, pp. 1269–1276, 2008.

[2] H. Shen and T. Basar, “Optimal nonlinear pricing for a monopolistic network service provider with complete and incomplete information,” IEEE Journal on Selected Areas in Communications, vol. 25, no. 6, pp.1216–1223, 2007.

[3] F. Kelly, “Charging and rate control for elastic traffic,” European Transactions on Telecommunications, vol. 8, no. 1, pp. 33–37, 1997.

[4] “AT&T shifts to usage-based wireless data plan.” available on AT&T official website.

[5] A. Daoud, T. Alpcan, S. Agarwal, and M. Alanyali, “A stackelberg game for pricing uplink power in wide-band cognitive radio networks,” in Proceedings of IEEE CDC, 2008.

[6] F. Kelly, A. Maulloo, and D. Tan, “Rate control for communication networks: shadow prices, proportional fairness and stability,” Journal of the Operational Research society, vol. 49, no. 3, pp. 237–252, 1998.

[7] S. Low and D. Lapsley, “Optimization flow control: basic algorithm and convergence,” IEEE/ACM Transactions on Networking, vol. 7, no. 6, pp. 861–874, 1999.

[8] S. Kunniyur and R. Srikant, “End-to-end congestion control schemes: Utility functions, random losses and ECN marks,” IEEE/ACM Transactions on Networking, vol. 11, no. 5, pp. 689–702, 2003.

[9] M. Chiang, S. Low, A. Calder bank, and J. Doyle, “Layering as optimization decomposition: A mathematical theory of network architectures,” Proceedings of the IEEE, vol. 95, pp. 255–312, 2007.

[10] S. Li, J. Huang, and S-YR Li, “Revenue maximization for communication networks with usage-based pricing,” in Proceedings of IEEE GLOBECOM, 2009.

[11] F. Kelly, “Charging and rate control for elastic traffic,” European Transactions on Telecommunications, vol. 8, no. 1, pp. 33–37, 1997.

[12] F. Kelly, A. Maulloo, and D. Tan, “Rate control for communication networks: shadow prices, proportional fairness and stability,” Journal of the Operational Research society, vol. 49, no. 3, pp. 237–252, 1998.

[13] S. Low and D. Lapsley, “Optimization flow control: basic algorithm and convergence,” IEEE/ACM Transactions on Networking, vol. 7, no. 6, pp. 861–874, 1999.

[14] S. Kunniyur and R. Srikant, “End-to-end congestion control schemes: Utility functions, random losses and ECN marks,” IEEE/ACM Transactions on Networking, vol. 11, no. 5, pp. 689–702, 2003.

[15] M. Chiang, S. Low, A. Calderbank, and J. Doyle, “Layering as optimization decomposition: A mathematical theory of network architectures,” Proceedings of the IEEE, vol. 95, pp. 255–312, 2007.