

History of Internet Pricing

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Abstract

Communication technologies and services have played a crucial role in connecting people for over two centuries. Pricing has acted as one of the valuable tools in maintaining and promoting these services among the social community by providing higher revenues and better utilization of networks. This article takes a look into the history of communication pricing in general with emphasis on Internet. It also discusses the pricing trends in legacy systems [Mail and Plain Old Telephone System (POTS)], fixed Internet and the nascent Mobile Internet services market. It enumerates the various pricing schemes proposed but not practiced in this area. It also lists down observations on pricing schemes and highlights the challenges involved in pricing the upcoming mobile Internet services and the open issues thereof.

Keywords: Pricing, Fixed Internet, Mobile Internet

1 Introduction

Communication technologies have been addressing a primary need i.e. to communicate, in the human society since the early part of 19th century. Pricing has played a prominent role in commercialising the communication services and technologies. At times, it has also served as an impediment to the success as well. New technologies with varying degrees of investments have adopted different pricing schemes to achieve higher revenues. Quality differentiation and price discrimination strategies are some of these. However, historically we see some common pricing trends for services. This could be attributed to the common behaviour of customers and their affinity towards simplicity. With advent of fixed Internet in the last decade and an upcoming mobile Internet, new challenges have evolved in pricing the services together with an opportunity to earn higher revenues and providing better services to the community at large.

The article begins the discussions by recording the major landmarks in the communications history in section 2. This is followed by a retrospective analysis of pricing trends in legacy systems [mail and pots], fixed Internet and mobile Internet services in section

3. It concludes with observations and open issues in section 4.

2 Landmarks

Mail, one of the earliest communication services to be commercialised and used by the masses came into existence in the early part of 19th century. This service has continued to expand since then even with increasing competition from rival services like the POTS and telegraph in the later years. The telephone services evolved in the early part of 20th century and still commands a substantial share of the communications market. However, the greatest invention to hit the human society by far has been the Internet. What started, as a research project in 1969 in the US was open to commercial use only in 1991 when the restrictions on NSFNET were lifted. In the same year GSM services started commercial services in Europe. The year 1993 was a landmark year in the commercialisation and promotion of Internet further. The US military parted ways with the public Internet and WWW browsers were launched. Since then, the Internet has progressed and spread across the world at an enormous pace providing and efficient and faster means of communication for the world community. At the same time, it unfolded an opportunity for the service providers to earn greater revenues by offering better and efficient services. The mobile services also developed enormously and have overtaken the fixed Internet users in some countries. The recent years see a convergence of these two highly successful technologies to form the mobile Internet.

3 Evolution of Pricing

This section discusses the evolution of pricing schemes from the days of mails and telephones to the present day mobile and fixed Internet services. It summarises the service life cycle based on historical trends and look at some of the schemes that has been proposed but not put into practice thus far.

3.1 Pricing Trends: In Retrospect

3.1.1 Legacy Systems

Mail and telephone services have been the major services in communications history as mentioned before. It is worthwhile to study the pricing trends in these services to understand the behaviour of customers and their needs. Mail pricing was initially distance dependent and at times complicated both in UK and US before it finally settled down to the flat prices. The introduction of flat pricing showed a substantial growth in mail usage [1].

In the case of telephones, cost was the greatest early impediment to its success. The higher cost was primarily due to the higher infrastructural costs and competitions from other services like telegraph. Thus it was only restricted to an elite class which resulted in limited usage. Prices for long distance calls were initially distance dependent and time-based in the US. Distance dependence was eliminated completely and time of day variation was reduced from 3 tiers to 2 tiers in the new competitive environment.

3.1.2 Fixed Internet

Although fixed Internet became accessible to the mass public only in mid-1990s, there was a growing online services industry with companies like CompuServe, Prodigy and AOL. Email messages were charged. Some services were charged as premium services, for Instance: CompuServe charged users for information retrieval from its database.

3.1.2.1 Residential Access

Until 1996, the pricing strategy for residential access was based on a fixed monthly fee for a specified amount of hours and usage-based fee for the additional hours. Because of intense customer pressure, the strategy has been shifted to a flat pricing model in the US and many other countries for unlimited access per month. This is being increasingly followed by a majority of service providers.

3.1.2.2 Leased Lines

Leased lines are used by corporates for data transmission and are hidden from the public Internet. Before 1983, in the US, the pricing was based on the air distance between the endpoints of the link. Today,

the market has become competitive after the removal of regulations and break up of AT&T. Frame Relay and ATM that multiplexes traffic for many customers are getting increasingly popular. Prices have become distance independent with international circuit rates priced higher than the domestic US ones. Prices are now based on static contact parameters like access speed and dynamic parameters like actual average rate of a connection [2].

Dedicated business connections to the Internet largely had flat pricing. However, some carriers also charge on the basis of a bursty-rate model. In this model, the service providers take samples of the traffic periodically, say every hour, and then 5% of the highest samples are discarded. The remaining sample is used to identify the bandwidth at which a connection is charged. Table 1 [1] shows an example of this charging scheme used by UUNET.

Table 1 UUNET bursty-rates for Internet access

Flat rate T1 (1.54 Mbps): \$2500/month	
burstable T1:	
95-th percentile of bandwidth	monthly usage price
< 128 Kbps	\$1300
128-256	1900
256-384	2500
384-512	2750
>512	3000

3.1.2.3 Interconnection

Peering agreements are increasingly seen as the strategy for international circuits [2]. Here, both the service providers exchange traffic on a mutual basis without charging each other. Since the international circuits are much more expensive than the domestic backbone, peering provides strong incentives. The decision to peer depends on the amount of traffic flowing in both directions. Any difference in benefits perceived by either parties leads to negotiations for compensations.

3.1.2.4 Services

The content services in the fixed Internet have seen revolutionary pricing ideas. Contents have been provided free of cost to customers based on an advertising model [3]. The revenue of the content was earned from the advertisements on a particular site. However, this pricing model failed to generate enough revenues thus leading to the adoption of subscription and transaction-based pricing model. For Instance: e-journals, online newspapers, music sites etc. Later part of the last decade saw a multitude of content providers in Internet loosing out due to the lack of a proper pricing policy.

3.1.3 Mobile (Internet) Services

Mobile voice services developed in parallel to the fixed Internet services and have even surpassed the Internet connections in some countries. Unlike the fixed Internet, the mobile services have followed a metered pricing model. The payment mechanisms followed were largely of two main types.

- Pre-paid services: A subscriber is charged for the voice services prior to usage.
- Post-paid services: A subscriber is charged for the services after the usage.

Block pricing has also been adopted by some service providers in recent times. The AT&T Digital One-Rate plan in 1998 [1] is one such example. Here, the customers were given an option with monthly initial rates of \$90 for 600 minutes, \$120 for 1000 minutes and \$150 for 1400 minutes. This further included the roaming and long distance charges. Although this may lead to some loss for the carrier, roaming is considered as only a fraction of the whole usage and many customers don't use all their allotted lot. So overall the carrier gains from the whole package.

The growing need for convergence of voice and data provides an opportunity for the mobile service providers in adding value. This convergence has been remarkably implemented and profitable in the case of I-mode services based on a proprietary standard provided by NTT DoCoMo in Japan. Realising that DoCoMo's core competency is not in content development, they served as a gateway between other content providers and the subscribers, thus charging a fee from the content providers as well as subscribers [4]. To summarise the model, DoCoMo's main aim is to sell data and not content. A highly successful content provider would lead to an increased data

usage thus maximising the profits for DoCoMo. However, there are some drawbacks to the pricing model [5]. The monthly content charge is capped at 300 yen (approx. \$2.5) that prevents companies with higher value content to fit in the model.

Mobile messaging services on GSM have acted as additional sources of revenue for the operators in the 1990s. Pricing was one of the major factors for the success of these services besides interoperability. Different operators have followed different pricing strategies. Some of the most common being the per message pricing and bundling of the voice and SMS services. There are also instances of operators providing free SMS services (in Philippines). MMS is expected to play a similar role in GPRS with added advantage of graphics with text. The pricing of this messaging service has thus far followed the SMS model [9].

3.2 Service Life Cycle

Based on the historical trends in communication services pricing, the services seems to have a life cycle as illustrated in Figure 1.

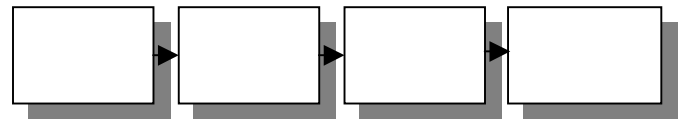


Figure 1 Service Life Cycle

3.3 Pricing Models: Proposed

The pricing models discussed so far were those implemented in the market. However, there were some additional pricing models proposed for the Internet in the last decade. These are not widely accepted by the market yet. However, an understanding of these models would be useful. We list some of them here.

- Paris Metro Pricing [6]: This can be considered as the simplest form of differentiated services where pricing is based on the quality of the service required. The model aims to reduce congestion based on charging higher prices for higher quality of services and thus avoiding more complex QoS models. The pricing model

could be considered as one form of service differentiation model.

- Edge Pricing [2]: This model aims to determine the prices locally. This means that the subscriber is charged based on the metering at the edges of the home domain. This has some advantages for the service providers. The multilateral contracts as well as activities like transferring the billing information could be avoided. It could be also used for charging receivers instead of senders and also multicast services.
- Congestion-based Pricing [6]: This pricing model as the name suggests proposes to price the services based on the level of congestion generated. In a congested network, the users may need to provide higher charges in case they exceed the previously agreed usage. Many proposals on this were made with some network-based feedbacks.

4 Observations

Having discussed most of the existing pricing models, this section analyses the trends in pricing models. The customers seem to be interested in a simpler pricing model since the early days of mails to the present mobile and wireless Internet. This is evident from the fact that most of the pricing models have given way to some type of flat pricing scheme that keeps the charging and billing procedures simple. There seems to lack of viable pricing schemes for content services in the fixed and mobile Internet. This is highlighted by the dotcom crash that lead to many companies going bankrupt overnight. I-mode like model could be one mode of pricing that could be further studied in this regard. With e-commerce becoming more prevalent recently, online pricing or e-pricing of commodities in the Internet has been identified to have many advantages. A McKinsey Study shows the advantages of e-pricing [7]. According to the studies, online pricing could help identify the pricing indifference band of the customers, i.e., the range of prices where a change would cause no behavioural changes in the customer towards the product. The e-pricing also helps to make quick adjustments to prices in response to market conditions. It also helps in identifying customer's segment and set prices accordingly.

With an increasing amount of effort around the globe on making convergence a reality, there remains major issues that needs to be looked at. The following

section is devoted on those issues that makes this convergence scenario different from the previously discussed communication markets.

4.1 Mobile vs. Fixed Internet

With the advent of GPRS and 3G services in the market, convergence is almost a reality. However, like the fixed Internet, a viable or profitable pricing and business model still eludes it. It is evident that the mobile operators or carriers would play a major role in this convergence. It would be useful to understand the highlights of mobile Internet that makes it unlike the present day Internet.

Some interesting observations have been made in [8]. Mobile Internet will have a personal focus. This should be reflected in the services provided. Location-based services could be one such example. This would add value to the customer and thus an operator could ensure increased usage. The relationship between the value of the service and pricing should be made clear. A pricing model that fails to establish this relationship might decelerate the market development. With convergence, voice becomes only one of the many services that could be provided on mobile Internet. This may reduce the operator to be only a transport provider in the eyes of the customer, as content is considered more valuable by many customers as in the current Internet. Hence, there is a need to avoid this scenario by co-branding with any popular content providers. This would in turn create increased data traffic. A Walled garden approach may not be successful as the amount of content required for generating an increased usage is enormous which this approach would fail to provide. In this regard, introducing virtual community based services would show better usage, as there would always be a dedicated number of users for these services. Trust could be major factor that could be exploited by the mobile operators. Since customers trust the operators more than the content providers, charging and billing could be offered as a service by the operator to the content provider and thus earn added revenues. Tiered pricing could be a useful model to attract new customers. An existence of a lower-rate pricing model that gives the user access to better service for a higher price would entice the customer to choose a higher valued tier. This would enhance data usage and revenue. The pre-paid users community could be targeted for greater revenue because they seem to allocate a greater amount of their budget for entertainment and are also receptive to gadgets like latest communication products. Thus the aim of the pricing model for the operators in the

changing circumstances should be to attract new customers, increase the data usage by adding greater number of data services and avoid being reduced to only a transport provider.

4.2 Open Issues

Finally, this section enumerates the open issues that require answers for a profitable pricing and business model in the mobile Internet of the future. One of the issues that have attracted attention most often is to find if flat or usage-based pricing model would fair better. Although the trends in history shows swaying towards the flat pricing, usage-based would possibly fit well in the new paradigm. However, this will have to be tested in the future. Another issue is whether to separate the transport from the content. There is a possibility of operators to become “dumb-pipes” unless they portray their contributions in content to the customer. This in turn raises questions on the kind of revenue sharing models to be adopted. Should they adopt a walled garden approach as mentioned before or start producing their own portals and contents. These and many more questions would have to be answered in the coming days for the mobile Internet to be successful and to avoid commercial disasters similar to the one experienced by the present day fixed Internet.

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