

Social Optimality of Alternative Business Models

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Abstract

The purpose of this paper is to introduce some basic terminology of consumer theory and methods for analyzing social optimality. These are then applied to study the social optimality of the main business models in Wireless LAN (WLAN) Hotspot market today.

This paper has the ambitious target to give indication which combination of business models is most likely to produce a socially optimal solution.

1 Introduction

The social welfare research in communication services has its roots in the era of state owned Telco monopolies. In those circumstances the role of the regulator is to ensure that operators set the prices of their services in a socially optimal way. The services need to deliver utility value to consumers and at the same time allow the Telco's to cover their costs and make a profit the price setting was originally studied in a single service set up – the Telco providing a fixed voice service to its customers in a monopoly environment.

Now the fixed telephony market is decreasing. The GSM, 3G markets and Internet Broadband access markets are saturating. The most interesting growing area in the Information Society is the Wireless internet access and the WLAN Hotspot services market

The interesting challenge is to try to take the welfare research further and apply it to the fast moving WLAN business where new business models are arising. The dilemma becomes even more complex as multiple radio access is available and the affect of these should be considered [1].

As new markets are emerging the social planner / regulator / politician needs to follow the development of the market and be ready to take the necessary action to create an environment of healthy competition and welfare creation.

The purpose of this study has been to look at the Welfare research available, select most interesting business models and look at the aspect of social optimality.

Some research is already available which is aiming to analyze the social optimality of WLAN Hotspot business models.

2 Terminology

The purpose of this section is to introduce some basic terminology which is used in the social optimality research and literature concerning communication services.

- User's utility = coverage & bit rate
- User's surplus = utility – cost
- Welfare = Users' surplus + sum of profits
- Ramsey pricing - named after English economist Frank Ramsey (1903 – 1960), prices that maximize industry consumer surplus and profits.
- Network externality - value of the network increases as a square of the number of the users (Metcalfe's law)
- Monopoly – a single supplier who controls the amount of good produced. The government regulates the monopoly's prices, allowing it to cover costs and make a reasonable profit.
- Perfect competition – many suppliers (and consumers) in the market, every participant is small and so no one can dictate prices
- Oligopoly – a competitive market of a small number of suppliers

3 Methods for Analyzing Social Optimality of WLAN Business Models

Social welfare (which is also called social surplus) is defined as the sum of all users' net benefits, i.e. the sum of all consumers' and all producers' surpluses. In the research weighted sums of consumer and producer surpluses can be considered, reflecting the reality that a social planner / regulator / politician may attach more weight to one sector of the economy than to another [2].

The key idea in regulation is that the social welfare can be maximized (and social optimality reached) by setting appropriate price and then allowing producers and consumers to choose their optimal levels of production and consumption. A supplier sets his level of production

knowing only his cost function, not the consumers' utility functions. A consumer set his level of demand knowing only his own utility function, not the producers' cost functions or other customers' utility functions. Individual consumer's utility functions are private information, but aggregate demand is commonly known [2]. Figure 1 shows an illustration of the social welfare maximization for a single good.

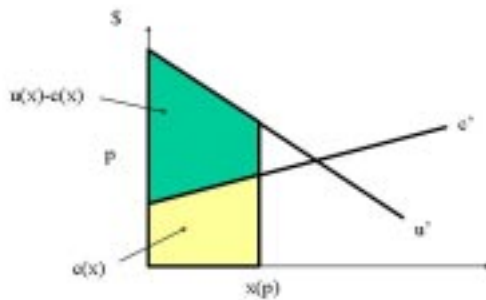


Figure 1. A simple illustration of the social welfare maximization for a single good [2]. The maximum is achieved at the point where the customer's aggregate demand curve u' intersects the marginal cost curve c' .

The approaches for analyzing social optimality are those generally used in analyzing the microeconomic impact, pricing and social welfare of communication services.

The main areas that need to be considered are [2]:

- Demand, supply and market mechanisms
- Maximization of consumer surplus
- The suppliers problem
- Welfare maximization
- Cost Recovery

3.1 Ramsey prices

Ramsey pricing is a pricing theory which often applied for publicly produced private goods. Ramsey prices are prices that maximize social welfare under the constraint of recovering cost [2].

Here we have a connection between competition and social efficiency. Under potential competition incumbents will be motivated to use prices that maximize social efficiency with no need of regulatory intervention.

3.2 Pricing example

The core of the social optimality is in the price setting. In the case of communication services the price setting can be problematic. Adding a new service to the offering could increase the cost of the infrastructure only marginally – especially in the beginning when this service has only few customers. As usage grows the cost allocation might need to be reconsidered and the marginal cost thinking does not produce the right result. The original mainstream product has become marginal and the originally marginal product has become the main offering.

As an example of pricing challenge we could consider the following. Let's take as an example of Internet broadband access with WLAN as add-on, a multi radio handset and cellular voice – these products and services could be offered separately or packaged as a wireless home offering.

The new multi radio devices enable the operators to commercially package services like cellular voice and Wireless LAN access – with VoIP and eventually with UMA capabilities when these services are introduced to the market

As a packaged service offering 'Wireless Home' this service could be offered with flat fee pricing – maybe 50-100 €/month. The interesting question is – how is the revenue allocated to individual services, how is the cost allocation and profitability of the service calculated and how does the regulator follow that the pricing is socially optimal?

In this literature study it is not possible to go further with this example but it could be analyzed in future research.

4 Business Models

The selection of business models is linked to the market environments described in Chapter 2. The three models selected are [3]:

- Telco model – hotspots owned and managed by Telco (monopoly)
- Free radio – individual users connect to individually owned hotspots (perfect competition)
- Hotspot aggregator – an intermediate between users and individual hotspot providers (oligopoly)

In Figure 2 the models are illustrated on a high level.

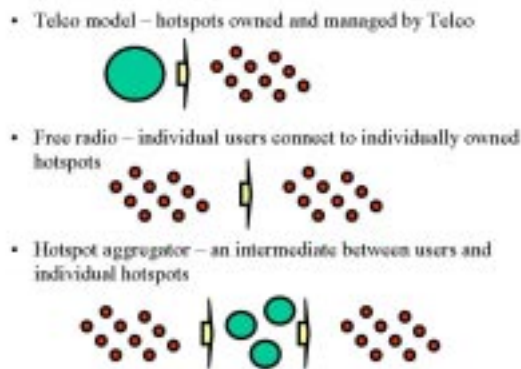


Figure 2. Alternative Business Models

Besides these three selected business models there are also various other models arising in the market today [4]

- Fixed wireless broadband (Wimax)
- Commercial WLAN Hotspots
- Mutual agreement – P2P
- Campus WLAN
- Hotspot sharing

4.1 Service architectures

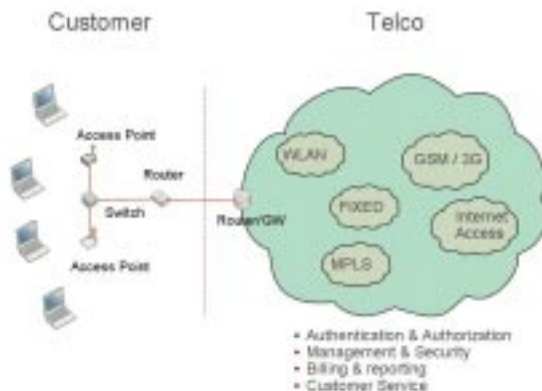


Figure 3: Service architecture of Telco Business Model

As an example to illustrate the Wireless LAN service architecture the Telco service architecture is described on a high level in Figure 3. This illustration describes the situation when a Telco provides a Wireless LAN Hotspot service to a customer. Wireless LAN service is one service in Telco's service portfolio. In the case illustrated in Figure 3 the customer could be a company

who offers wireless access to Internet to its customers visiting the office and wireless Internet and intranet access to its employees. The employees could use a Virtual Private Network (VPN) service to access the corporate network and intranet. The visitors would need to authenticate themselves before accessing the Wireless LAN Hotspot. The Telco customer could also be a Hotel who offers WLAN Hotspot services to its customers.

The service package could include the Wireless LAN and basic LAN infrastructures, the Internet connection and management and security services for the whole infrastructure.

The service architectures of Free Radio and Aggregator business models differ from this in following main points:

- In Free radio the centralized management of services does not exist as the business model is based on P2P approach
- In Aggregator Business Model the additional services (e.g. authentication server) are produced by the Aggregator as the Internet connection comes from the Internet Service Provider.

4.2 Telco Business Model

In literature [3] the Telco business model is linked with the monopoly position where Telco has free hands to set price and optimize its profits

A Telco can include a user authentication to the service and reduce security risks and potential misuse of the access

Telco business model with centrally managed service leads to high bit rate and availability. Focused coverage and high cost reduce the User's surplus.

By definition the monopoly Telco can choose its price for the services. Based on this a Telco makes good profit and as a good taxpayer contributes to the social welfare.

4.3 Free Radio Business Model

Free radio is an application of the P2P approach. Individual hotspot owners open their connections for everybody. A centralized coordination is not required. Instead, the network of hotspots can operate in fully decentralized way.

The main question the Free Radio model is - Charge or not – does the individual user charge other users for the service. Free radio indicates that there is not charge. With no charge the business model generates a loss as hotspot setup and management generates a cost.

User's utility is high when the Free radio business model is widely accepted – coverage is good, high bit rate available with no cost. The service availability and predictability could be a challenge.

Free radio typically leads to a high number of hotspots. The security risks are evident as no user authentication is required.

4.4 Hotspot Aggregator Business Model

A Hotspot Aggregator is a managed Free Radio P2P community with a 3rd Party as an aggregator

A hotspot aggregator provides a platform for the users and the providers of hotspots. The platform could include authentication service to for security reasons

The hotspot aggregator needs to charge a price to cover its costs. Costs are generated from the service platform setup and management. If number of hotspots is high the cost for users is marginal. The profit optimization happens as a function of the price charged from the user and the fee paid to the hotspot providers.

The business model has potential to be socially good solution. If widely accepted the coverage is good and the costs are marginal. The presence of an aggregator brings managed service elements to the model and this increases the predictability, security and of the quality of service.

5 Conclusions

Three business models were selected from the research as examples for studying the social optimality of hot spot business models: The business models are called Telco, Free Radio and Aggregator. The results are summarized in Table 1.

Table 1: Summary of results

The research [3] does not give any easy answers to the regulator / social planner. A mathematical model has been created but the result as such does not give indication which business model would be the most beneficial for the social optimality. Each model has its own strengths and weaknesses.

The analysis needs to be developed further so that the differences in welfare creation between business models can be found.

The effort should then be continued and results applied with possible market development scenarios to find out the impact of regulatory actions to the social optimality of the models.

These scenarios could then be used in real life situations e.g. by the social planner in the decision making concerning regulatory activities.

References

- [1] Business Models for Public WLAN, Presentation by Jaakko Kuosmanen in Telecommunications Forum 2006
- [2] Courcubetis, Weber: Pricing communication networks – Economics, Technology and Modeling, Wiley 2003
- [3] Hotspot Services in the Open Spectrum: Implications of Market Organizations for coverage and welfare, March 10, 2006.
- [4] VoIP and WLAN – Changing the rules, Presentation by Klaus Nieminen in Telecommunications Forum 2006

Business Model	Number of Hotspots	Bit rate	Cost	User surplus	Profit	Welfare
Telco	●	●	●	●	●	●
Free Radio	●	●	○	●	○	●
Hotspot Aggregator	●	●	●	●	●	●