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Abstract

Current mobile business models for mobile commerce do not seem promising with regard to substantial revenue streams for mobile network operators as well as mobile service providers. Today's settings require customers to "invest" into data transmission before being able to enter a mobile service, i.e. they are forced to pay for all data transmitted regardless whether this data is valuable content or just unwanted marketing messages. In this paper we propose a new business model, which allows mobile service providers to use information about the customer by situation based profiling in order to identify high value customers and sponsor their data transmission costs. It is shown, that by applying this approach revenue streams can be increased significantly for all parties involved, contributing to a more positive perspective for future developments in the mobile market.

Keywords

Business model design, mobile commerce, mobile telecommunications industry, mobile services, situation based profiling

1. Introduction

With the introduction of mobile data services, such as GSM Circuit Switched Data (CSD), and the availability of application environments on mobile terminals (e.g. WAP), the usage of the mobile Internet had become feasible on a large scale focussing on millions of already

existing mobile telephony customers. On the basis of these technical prerequisites it is possible for customers to complete transactions or to consume information products (e.g. news, games, navigation etc.) using their mobile phone (May 2001). The term mobile commerce (m-commerce) had been introduced for commercial applications of the mobile Internet and enormous future revenues have been expected (Durlacher 2001, UMTS Forum 2001a). With these fantastic predictions in mind and while looking at the success of the fixed Internet in the late nineties, mobile network operators started to invest massively in future infrastructure and licences (GSM World 2001).

But one important aspect has been ignored: Due to high investments and maintenance costs for the mobile network infrastructure, network access cannot be offered at same low rates as in the fixed Internet to private customers. This leads to diminishing revenues for all parties in the value chain and vast "m-commerce scepticism" (Wearden 2001).

Only if all parties (mobile customers, network operators and service providers) can increase their profit significantly, the whole market potential might be realised. Therefore existing mobile business models have to be reconsidered with regard to (Staehler 2002, Timmers 1998)

1. value proposition,

2. revenue model, and

3. architecture for value provisioning.

The value proposition describes which utility for clients and business partners is being generated. The revenue model defines income channels and pricing models, while the architecture describes value provisioning and the way the participating parties are arranged in the value chain. This trisection (value proposition, revenue model and architecture) is a guideline for the following two sections of the paper which is organised as follows. As a first step in developing a new business model we describe the current mobile business model and identify its shortcomings. In section 3 a new business model is being introduced and the concept of dynamic customer profile generation is explained. In section 4 we take a look at current figures to demonstrate the practical applicability of our model. After that, in section 5 privacy issues are being discussed. Finally, section 6 concludes the paper, summarises the contribution of our work, and gives an outlook to further research.

2. Traditional M-Commerce Business Models

2.1 Value Proposition

The mobile network operator offers different business values to its business partners: service providers and mobile customers.

From a service provider's point of view the operator's network infrastructure is an attractive new channel to interact with mobile customers. It is attractive as mobile customers usually have a relatively high budget to spend and they form a market that is easy to address with the help of mobile infrastructures (Merrill Lynch 2000). Given an overlapping customer base for network operators and service providers, the latter can additionally use mobile infrastructures as an effective customer care instrument, e.g. for customer relationship management.

By offering mobile services the mobile network operator provides an extended usage portfolio for mobile terminals to its customers. In extending "simple" mobile voice telephony,

customers are empowered to solve all day mobile context problems (e.g. navigation, infor-mation or entertainment) by using the same network. Thereby the mobile network operator is able to increase the usage intensity of its mobile infrastructure and the average revenue per user (ARPU). But due to the lack of instruments to make a mobile service a billable entity (which would have allowed financing more complex service functionality) up to now mainly services with limited functionality have been available. That has led to unsatisfied customers who have been experiencing services not meeting their expectations and therefore stepped back from using mobile services.

2.2 Architecture for Value Provisioning

Nowadays (see figure 1) mobile services are mainly developed and provided by organisations owned by mobile network operator companies (1) (examples are Vizzavi, Vodafone Passo, T-Online, or Tegaron). External content, such as cinema programs or point of interest infor-mation, is bought from content providers (2) and paid for (often in a lump sum). This data is typically stored within the operator's own infrastructure and brought to market and customers (3) at their own expense (Shillingford 2002). As mobile network operators have other core competencies, like billing communication services and maintaining large network infra-structures, they may be limited in terms of developing and marketing these mobile services.
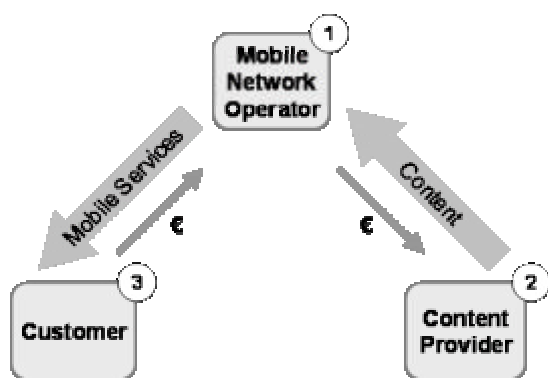

Figure 1. Classical value streams for m-commerce

Therefore a less network-operator-centric architecture has developed with regard to mobile service provisioning (see figure 2): Mobile network operators are limiting their activities to the operation of a content provisioning platform (1) that allows service providers (2) to offer their own services. With the help of these platforms it becomes possible to introduce the value of strong non-mobile brands (e.g. McDonalds, Amazon, Financial Times etc.), origi-nating for example from the food or retail sector, into the m-commerce market. The mobile network operator only specifies the necessary interfaces (3), operates the technical architec-ture and handles the charging and collection process. A current example for this approach is the i-mode service in Japan and Europe (http://i-mode.nttdocomo.com). It abandons any self maintained services other than the portal and platform operations.

The whole setting aims to create what is called a mobile "eco-system" to leverage core com-petencies of each party for the best overall result. The mobile network operator acts as an intermediary between supply and demand in the m-commerce market, ensuring that service providers are getting their money and that customers are receiving only services of agreeable quality.
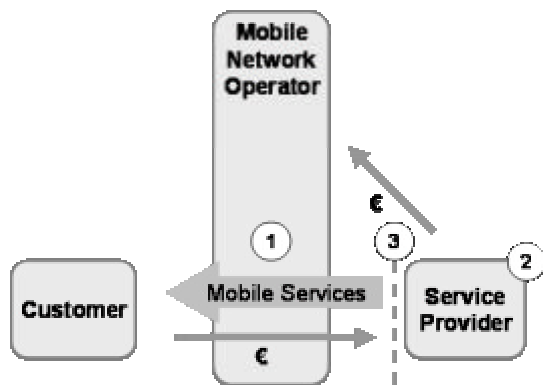
Figure 2. Current value streams for m-commerce

Obviously both models can exist in parallel, but with the opening of mobile networks and the decentralisation of the m-commerce service provisioning service providers are able to access valuable information that resides within mobile networks and has formerly only been available to mobile network operators. That includes information about position and identity of any connected mobile device. With the availability of that new meta-information about the user's presence, a service provider is able to design more intelligent and user-friendly services. That context or presence information is currently limited to the position and identity as there still remain unsolved concerns about data security (cf. section 5).

2.3 Revenue Model

Since the introduction of WAP to the mobile market, revenue models have been designed to charge the mobile customer for any transmitted data while time based billing has been re-placed in favour of volume based tariff models. Mobile services have been cross subsidised in that way and shared revenue from data transmission has been the main income source for service providers. Special offers and promotions could therefore only be applied to these data transmission costs and have been the only strategic pricing instrument to influence the de-mand in the m-commerce market.

Compared with the initial WAP approach, the Japanese i-mode service represents a signifi-cant improvement, as mobile services become a billable entity and can be charged independ-ently from data. Customers can subscribe to a service on a monthly basis and use it within that time range as often as they like.

As the mobile network operators are still charging for mobile data the mobile customer has to pay for two things: The technical access to the mobile infrastructure and the service itself. The technical access does not provide any obvious benefit for the customer and it is not transparent with regard to the costs generated, as often the exact amount of transferred data can be identified at the end of the month only. For the customer that means a less than ac-ceptable situation as any kind of interaction with a mobile service can be a source of non-obvious charge.

2.4 Current Problem Analysis

The investment decisions for m-commerce and the mobile infrastructure have been made mainly with respect to the optimistic assumptions and the proclaimed market size estimated

by market analysts and investment bankers. Current usage and revenue numbers are lacking far behind these appraisals and as one result, the mobile telecommunication industry currently suffers from bankruptcies and financial problems. In that context

4. usefulness,

5. usability and

6. system costs

are often identified as user acceptance relevant aspects (Davis et al. 1989) and therefore a potential starting point to cure the described grievances.

The aspect of **usefulness** of m-commerce services relates to the value proposition which is propagated by the business model applied. It represents the value generated by m-commerce services and perceived by the customer. As already mentioned, mobile customers often do not consider this value to be satisfactory and therefore do not participate in the m-commerce market. One explanation is that current m-commerce only focuses on selling information products within a direct revenue model. Therefore the potential within the mobile extension of already existing business relationships in the context of traditional businesses is not leveraged. Many companies with strong brands do not identify m-commerce as a valuable field for involvement as they cannot apply the existing revenue model to their business. Many interesting services are therefore not provided and the range of services remains limited.

Another aspect to explain lacking user acceptance is the **usability** of mobile services. Due to the limited input and output capabilities of mobile devices (UMTS Forum 2002) m-commerce services provide only restricted interaction capabilities compared to stationary Internet services. These limitations might be compensated by applying extensive personalisation. Location based offerings are first examples depending on the position of the mobile device. An even more comprehensive adaptation depending on many influencing factors (age, interest, time, personal calendar etc.) is imaginable.

A last reason for current scepticism is high **costs** for participating in the m-commerce market. In current revenue models the customer is the only source of revenue and any kind of interaction with the service leads to significant charges. For that reason customers will not accept to pay for services containing advertisement. As a consequence companies cannot use the mobile channel as part of an overall business model, e.g. for customer care or marketing, and a large number of interesting services are not offered.

Finding a solution to these problems, means to increase the acceptance and the usage of m-commerce applications and the mobile Internet.

3. A New Business Model for M-Commerce

With respect to the problem analysis the following claims can be stated:

1. Integrating the mobile Internet into business models not aiming at direct revenue (e.g. marketing or customer relationship management programs) has to become feasible.

2. Information about the mobile customer's situation (dynamic customer profiles) has to be provided.

3. Applied revenue models need to be more flexible and have to include the service provider as a chargeable party.

The new business model aims at fulfilling these claims and at increasing the acceptance and usage of the mobile Internet.

3.1 Value Proposition

The value proposition of the new business model rests upon a reversed constellation of interests. Instead of having the mobile customer being charged to access information and services, the service provider is able to contact new business relevant customers and offer free data transfer to them. Due to the fact, that users always carry their phones with them (anyplace and anytime access) the mobile channel allows to reduce the price for initial customer contact and customer care. As a result, customers who qualify in terms of being business relevant do not have to pay for the initiation of business transactions. Their costs will be sponsored by the service provider. In the following, the architecture for this new approach is described in more detail.

3.2 Architecture for Value Provisioning

In order to apply a more complex form of interaction, the service provider has to be offered more and richer information about its customers. Only with a comprehensive, reliable and up-to-date-description of the customer the service provider is able to differentiate between relevant and non relevant customers and to determine, how much he is willing to invest into any customer. To put it in other words: The service provider has to have a clear idea of the customer's business value in the current situation. The information describing the customer's situation is generated by the mobile network operator and then transmitted to the service provider (Figge 2001). The process in detail appears as follows (see figure 3):
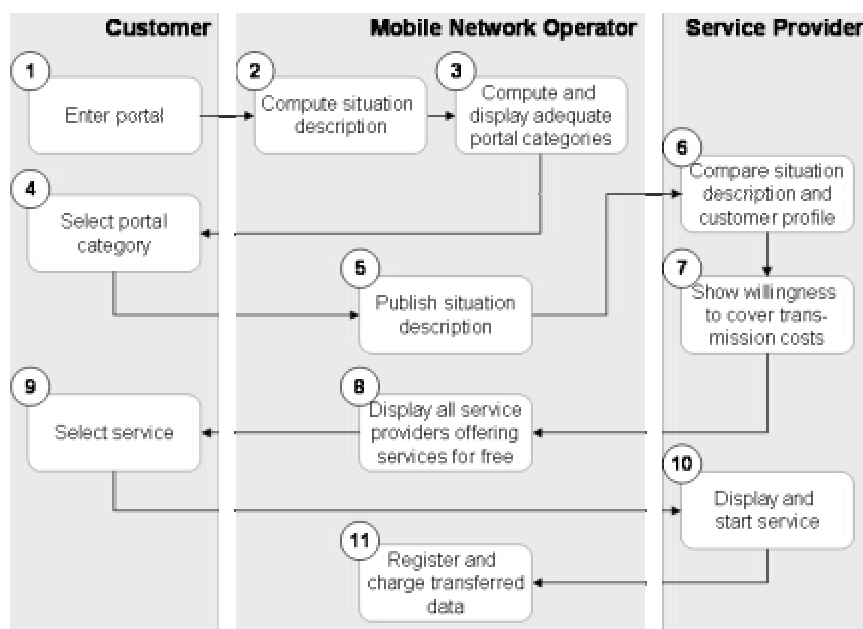

Figure 3. Portal process for a situation based business model

By entering the mobile portal (1), which is provided by the mobile network operator, the situation of the mobile customer is captured and portal categories relevant for that situation are displayed (2+3). E.g. if the current local time is near noon and if the customer is not fa-

miliar with his current location, the category "Restaurants & food" might be of interest. Whereas in the afternoon right within a business meeting that category does not seem to be appropriate. The customer selects one category (4) and his situation description is transferred to all service providers with services assigned to that category (5). Using the situation description, service providers can decide if the customer seems to be relevant for their business (6) in which case they cover the data transmission costs (7). After selecting the portal category, all service providers willing to do that get listed (8). The customer chooses one of the services (9) and the transmission costs are being billed to the respective service provider (10+11).

The decision of a service provider, whether a customer is business relevant or not, typically follows an automated process. Ideally, a target customer profile is being compared to the current dynamic profile available. The issue of profile matching is not being discussed here in detail, but typically several criteria are the basis for customer selection (cf. section 3.4). The following example is used to illustrate this process.

A chain of department stores in Frankfurt and Berlin with regular opening hours offers its customers a mobile shopping assistant service. A target customer profile has been created to catch middle-aged customers within the reach of the branches. With the opening of the portal category 'Shopping' the situation description of the requesting customer is transferred to the company and then compared to the target customer profile. Figure 4 illustrates three sample cases to show potential results of the process:
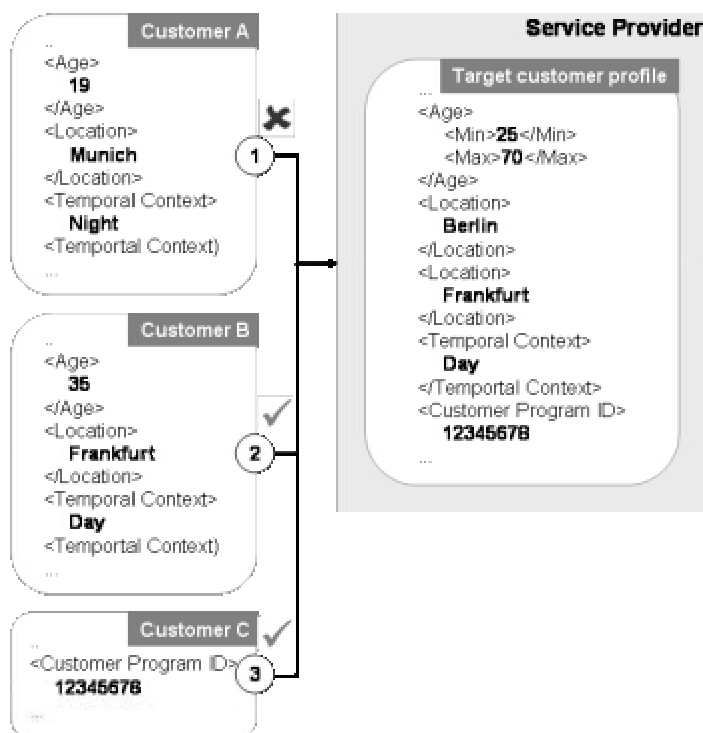

Figure 4. Matching situation description and target customer profile

Customer A's situation description and its properties (1) do not match the properties of the service provider's target customer profile. Neither age nor current location fit to the target properties. Sponsoring customer A does therefore not seem to be appropriate. In this case the service provider will deny paying the charges (of course, this does not prohibit the customer

from still choosing the service). The situation is different for customer B (2), whose relevant properties are matching. In this case the investment is promising, as the chances of the customer visiting the department store and generating revenue are high. The situation is even more obvious for customer C (3) who participates in the company's customer loyalty program and is therefore registered. In case the service provider holds information about the customer's past purchasing patterns it is easy to decide if an investment in terms of offering a free mobile channel makes sense from an economic point of view.

3.3 Revenue Model

With this new approach current revenue models are enhanced by including the service provider. The mobile customer still remains an important source of revenue in terms of mobile voice telephony and mobile services targeting direct revenues, but the existence of a chargeable service provider reduces the pressure to search for revenue at the customer's side only. By including the service provider, the usage of the mobile Internet gets more attractive as the choice of available services increases and becomes more cost efficient at the same time.

The pricing models offered to service providers can differ from those used for private customers. Instead of millions of mobile customers only a few hundred or thousand of service providers are interacting with the mobile network operator. That enables the implementation of flexible and individual tariff models, cross trading, lump sum payment etc. and opens up a new flexibility for marketing strategies.

The new business model therefore provides an adequate distribution of the revenue streams and allows the mobile customer to save money, too.

3.4 Building Dynamic Customer Profiles

A situation based business model and service offerings require a dynamically generated description of the user's current situation (see figure 5). Originating from technical information on identity and location (1), additional information pools such as customer care or geographic databases (2) can be applied to extend the semantic limits of the data provided by the mobile network. The resulting information set can include information such as the name of the current location, the local time or the customer's age or interests (cf. section 3.2). The comprehensive description is then offered and transferred as a dynamic customer profile to service providers in order to support

7. participating in a situation based business model and (3)

8. adapting mobile services according to the user's situation (4).

For that reason, dynamic customer profiles do not only enable the new business model as described in this section, they also provide an instrument to comprehensively individualise mobile services (Seybold & Marshak 1998).
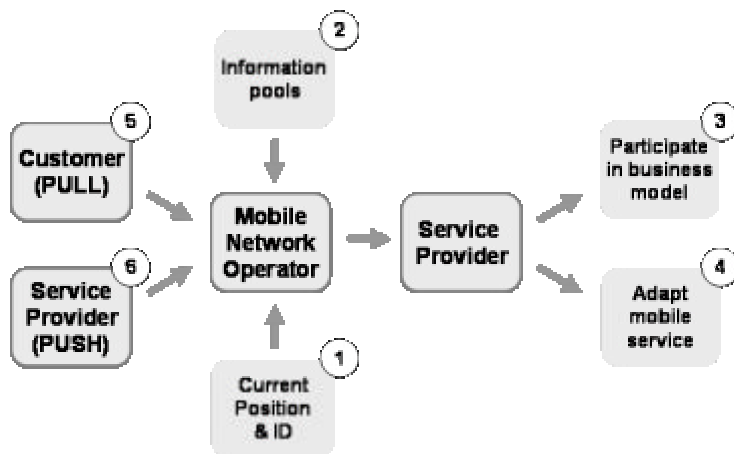
Figure 5. Triggers for building dynamic customer profiles

Profiles might be triggered in two ways. In the first case (5) the customer requests a service through a mobile portal in terms of the process described in section 3.2. The situation description is build along with the invocation of the provided service. As the customer determines the start of the service, this type of interaction is called a "pull service". In the second case (6) the interaction between the service and the customer is initiated by the service provider, e.g. by sending a Short Message Service (SMS) text message ("push service"). To avoid spamming customers with unwanted messages, push services are only activated after the customer has given a general approval for this kind of service. The service provider periodically checks the dynamic customer profile and in case of a matching with some event definition he sends a message to the customer.

Considering the heterogeneous IT-infrastructure of network operators and potential service providers, dynamic customer profiles have to be coded in a structured and interchangeable data format. The Extensible Markup Language (XML) is commonly used to describe structured data sets when using the Internet as a communication platform. XML includes metadata to enable automatic data processing. Several XML based specifications intending to provide open standards already exist. For example, the CPExchange Working Group is developing an XML based specification for a privacy enabled exchange of customer profiles (Bohrer & Holland 2000).

When exchanging private customer data between enterprises, questions of security and privacy issues come up (cf. section 5).

4. Calculating M-oney

In the following section, we aim at providing a number of simple calculations to justify our approach and draw connections to other business models in different (non-mobile) settings.

In **the "classical" setting** (cf. section 2) we assume that customers have to pay 10 € per Megabyte (MB) (a current price for GPRS traffic, T-Mobile 2002) of data transmission. Furthermore, we assume that 10% of the 1 Mio mobile network operator's customers are using mobile services (e.g. business news, navigation services etc.) and spending 20 € per month on them. This results in revenue of 2 Mio € (100.000 customers x 20 €). To use the mobile services, 1 MB of data traffic per month and customer are assumed to be necessary, which results in additional costs of 10 € per customer and revenues of 1 Mio € for 100.000 MB in total. The service provider hands over a margin of 10% of his 2 Mio € revenue to the

mobile network operator as a service fee, i.e. of the discussed 20 € the mobile network operator keeps 2 €. When using these numbers, revenue streams as given in figure 6 will result. The total costs of mobile services per customer and month are 30 €. In the classical setting we do not expect customers to buy non-digital goods using their phone (McMillan 2002):
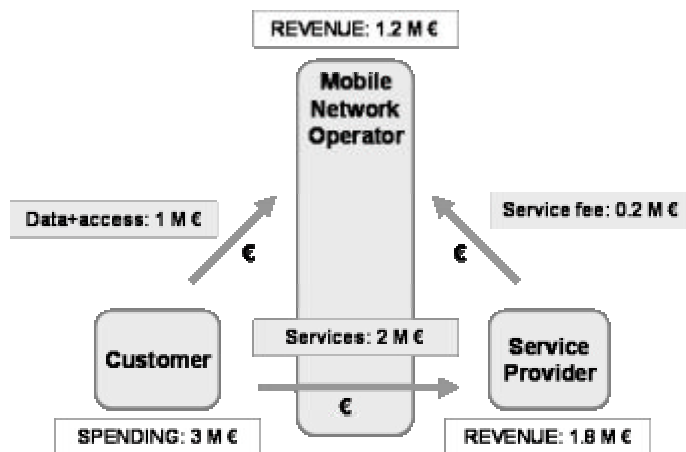

Figure 6. Sample revenue streams in a classical business model

In **our proposed setting** (cf. section 3) we again assume that the mobile network operator sells 1 MB for 10 €, but in this case to the service provider. More customers will use the services (mainly due to the fact that they do not have to pay for the data and access). The percentage of m-commerce customers will increase to 18% (this is the threshold to provide the service provider and the mobile network operator with a better or at least equal revenue situation compared to the classical setting) of all the mobile network operator's customers resulting in 180.000 instead of 100.000 customers. Consequently the 1 MB usage per customer amounts to 180.000 MB in total. Given the price of 10 € per MB this results in costs of 1.8 Mio €, which are paid by the service provider thus giving the mobile operator revenue of 1.8 Mio € instead of 1.2 Mio €.

Provided the 180.000 customers stick to the same behaviour as the 100.000 customers in the classical setting, the monthly spending on mobile services per customer is 20 €. The total spending towards the service provider therefore is 3.6 Mio € from which he pays data transmission costs and remains with 1.6 Mio € revenue. The following revenue streams result (see figure 7):
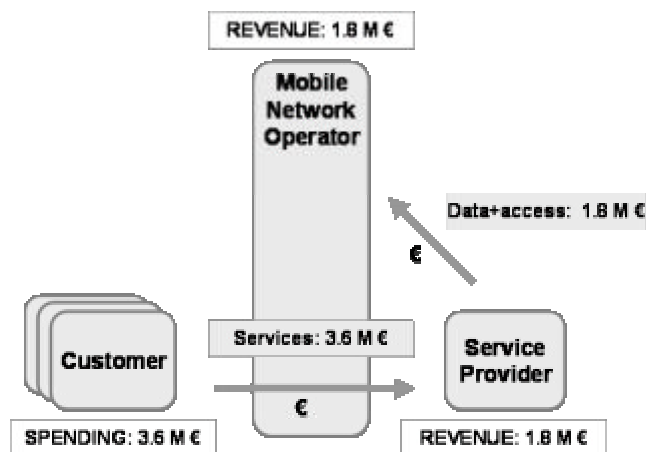
Figure 7. Sample revenue streams in a situation based business model
(same data transmission rates as in figure 6)

Now we assume that the service provider is able to buy data transmission at cheaper rates and thereby modify the described setting towards a win-win situation for all parties involved. 15% on formerly applied consumer rates for mobile data transmission is a reasonable discount. Hence, for the service provider 1 MB mobile data transmission only costs 8.5 € instead of 10 €.

From a customer's point of view the situation remains the same (she or he still does not pay for mobile data transmission) and the total spending on mobile services are 3.6 Mio €. Due to the cheaper data transmission rates the service provider has to pay less, only 1.54 Mio €, to the mobile network operator and remains with revenue of 2.07 Mio € (see figure 8).

In this setting all parties are better off than in the classical setting. The individual customer pays less for the same services while the service provider and the mobile network operator can increase revenues.
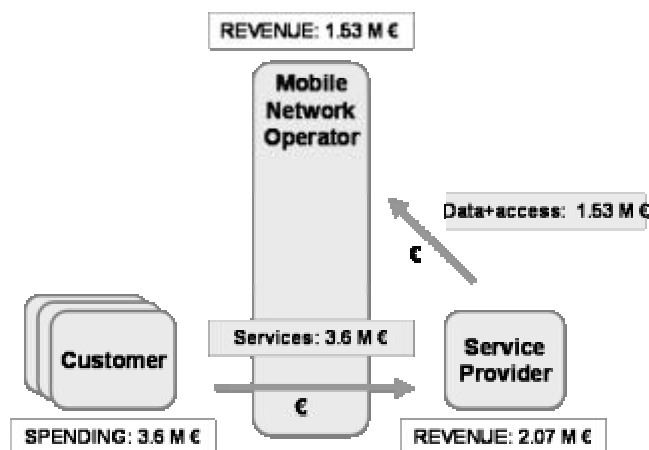

Figure 8. Sample revenue streams in a situation based business model
(discounted data transmission rates)

Our simple calculations show that the mobile network operator as well as the service provider can increase their revenue significantly and still customers pay less than before. Our assumptions for the calculation of the proposed new business model are actually very modest. It does not take into account that the customers will generate "traditional" (non-sponsored) data traffic besides their service traffic which will be financed by the service provider. Furthermore, our model does not include any cross-selling revenue streams with physical products (books, CDs etc.).

Unlike in the mobile world, pre-investment into highly profitable prospective customers is part of day-to-day business in brick-and-mortar settings. For example, Lufthansa sponsors the annual credit card fees for their "Senator" clients (Lufthansa 2002). In the media business, it is common practice to give free subscriptions to potential customers of journals for a limited time (Kotler 2002). But not only when acquiring new customers, also during existing relations, investments into customers, e.g. loyalty programs, play an important role (Shapiro & Varian 1998). In comparison to other markets, m-commerce allows a far more precise targeting of customers.

5. Privacy Issues and Properties

Customer profile oriented approaches and business models usually do not have the best reputation with regard to privacy. The usual suspicion (and experience) is that customer profile information leaks to whoever is interested with the customer not being able to exercise any control.

Therefore three aspects are of paramount importance:

4. Informed consent: The customer has to be asked when information is stored about him or her. This has to include a briefing on what information is being stored. The aim is to avoid the customer approving unconscientiously and being surprised later.

5. Control: The use of the data must be controlled by the customer, i.e. before situation descriptions (cf. section 3.2) are being transferred to the service provider she or he has to be asked again.

6. Data economy: Only data which is needed is to be stored by the operator and transferred to the service provider. This can include an anonymisation facility on the side of the operator that avoids that the real customer IDs are shown to the service provider.

The described mobile portal approach (cf. section 3.2) has to offer quite a few advantages over "normal" profiling mechanisms.

Informed consent and control are supported by the portal allowing customers to maintain and administer their data. This might even include the maintenance of this data by an arbitrary third party that enjoys the trust of the respective subscriber, e.g. a privacy advocate or agent. Control might be more difficult to implement as there is a trade-off with convenience. If the customer is asked in any case whether her or his situation description is to be transferred to a service provider, he or she might become very busy.

With regard to data economy the assessment depends on the trust relation between the customer and the mobile network operator: If the customer trusts the operator, this requirement should not be a problem as the decision by the service provider would be based on the situation description and not necessarily on the customer's ID which is kept by the mobile network operator. Also, the customer has the chance to withhold other identifying data by simply configuring his profile accordingly.

If the customer does not trust the mobile operator with too many data, there are two non-straightforward alternatives. One is to keep the customer anonymous to the mobile operator (e.g. by a non-registered prepaid card). The second alternative is to maintain the customer profile with a trusted third party using the mobile operator only as a transmission channel for the data. This would still allow money flowing from the service provider to the mobile network operator, but would reduce the risk of the operator becoming "Big brother". Of course one has to find a way to reduce the access facilities for the operator during transmission, which is not trivial and might not be possible to do in a perfect fashion.

In any case the approach to explicitly keep and transmit profiles and to coordinate this with the customer is advantageous over a situation, where nobody (especially no customer) really knows which data is kept where and transmitted to whom.

6. Conclusion and Further Research

In this article we have introduced a reverse charging approach which seems very promising with regard to current problems of mobile business models, e.g. limited numbers of custom-

ers, smallish revenue and little user confidence. With a few simple calculations one can see, that the proposed business model will increase revenue streams of all participating actors significantly.

This paper has to be seen as a first step in reconsidering existing mobile business models. Currently, we discuss the following questions as part of future research:

9. What will be the role of loyalty programs in such an approach? Up to now we assumed, that there are only three parties involved, namely customers, network operators and service providers. What will be the role of provider independent loyalty programs?

10. Which development path will network operators go? With decreasing communication prices their part in the value chain becomes smaller, unless they expand into new areas. Will they become profile merchants or stay with their approach in offering services by themselves?

11. Who might be a party trusted enough to alternatively store personal information to generate dynamic customer profiles?

12. What might be good ways of profile modelling and matching?

13. How to include "non-mobile"-data, like POS (Point-of-Sale) information?

14. How would this approach and its direct marketing possibilities compare to television marketing and other "broadcast marketing approaches"?

Acknowledgement

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