Enhancing Business APPification Using SMS Text Messages: Metrics, Strategies and Alternatives

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Department of Computer Engineering & Informatics
School of Engineering, University of Patras
Rio Campus, 26500 Patras, Greece

{paschou, sakkopul, sourla, tsak}@ceid.upatras.gr

Abstract. Mobile App stores and marketplaces allow sellers and developers to monetize their Apps mainly through the desktop-based download point, or by using the mobile owner's credit card. We would like to turn monetization focus on the fact that there is already another payment channel that should not be overseen, which is fruitfully used through the premium SMSs. In this work, we propose new metrics and strategies to enhance business APPification using SMSs efficiently and effectively, in two ways: a) SMS as a premium text service can be the mean to monetize Apps more easily than using HTTP protocol and credit cards – premium SMSs cost more than regular SMSs and return usage earnings. b) SMSs can be widely used as an additional "web" data transport protocol that may reduce user data access costs in some cases and therefore, allow new margin for monetization of apps. We also show prototype results that the proposed strategies and metrics assist.

Keywords: SMS Mobile App, Premium SMS, Alternative Monetization, Web Appification, Mobile e-Business, Business Apps

1 Introduction

During the recent years mobile devices have been embraced by everyone, thus creating a huge market that is expected to evolve even more in the years to come. Moreover, many consumers already take advantage of mobile applications to improve and assist their lives. Mobile applications solutions are widely accepted because they are easy to use. This is the reason why already numerous applications are available, which target different groups of people and domains (entertainment, information, health etc).

Frequently, in mobile applications, the need arises for the user to send and receive data, frequently on a regular basis. Many works study the ways mobile applications assist, but they all assume that people involved have access to internet connection and unlimited resources to dispose. However, this is not always the fact, as recent explosion of mobile data traffic indicates that plans that provide unlimited data usage are financially unsustainable. The technical and financial challenges of making such plans

available for everyone range from handling outdated network equipment, legacy handsets, and applications. All these issues contribute to additional costs, which need to be minimized. [1]

With a 97% delivery and read rate, SMS messaging is increasingly gaining recognition as the perfect customer communication tool [5]. Transactional SMS payment reminders are an extremely popular and cost-effective method of communication used in Europe and Asia [5]. SMSs can also be used in mobile apps to request or refresh content. Moreover, SMS is the only technology with 'push' capability, where the content provider sends SMSs to end users without their prior action. Such content might be advertisements, discounts or offers.

Another clear turn towards the use of premium SMSs is making payments for applications by SMS. Samsung Apps users are provided with this service after selecting an application from the store. They are prompted to select a payment method, one of which is “Phone Bill”. In this case the user receives a transaction confirmation via SMS and the subscriber's account is debited the appropriate amount. On the other hand, the KPMG monetizing mobile report [6] shows that SMS text is rapidly losing ground to newer technologies. In part, this is because of the complexity of ‘text codes’ that act as the doorway to SMS text payments. From the customer perspective, SMS text is also relatively limited in its ability to provide dynamic banking and payments solutions on a mobile device [6].

In this paper, we present a proposal of ways to enhance HTTP Protocol, utilizing the SMS transfer protocol. The latter has been already used for downloading an application, however less has been done for web access and data exchange. We focus on monetization of the application as well as on data transfer issues. We study representative cases and show that it is possible to maximize advantages of both protocols if we combine them wisely. We introduce metrics and apply them in an indicative scenario, without loss of generality. In particular, we point out how different transfer protocols can be used, depending on the volume and type of data to be sent and other environment oriented information. We keep in mind that SMS text protocol can also be utilized as a web services transport protocol.

The rest of the paper is organized as follows: Section 2 discusses related work and Section 3 describes issues related to monetization of applications. Section 4 presents SMS monetization utility metrics and Section 5 discusses three strategies presented through case studies. Section 6 includes the performance evaluation of the proposed metrics through a real-life scenario. Finally, Section 7 concludes the paper and gives ideas for further research.

2 Related Work

There have been several examinations of mobile monetization and the ways it could evolve to attract more customers and to satisfy both advertisers and carriers. The results of such an analysis can be used to provide insight for improvement in available models.

Chang and Huo [2] present the idea of increasing broadband subscribers by providing free or discounted fees through the deployment of mobile advertising framework by the telecommunication system. They describe a framework for delivering appropriate ads of the ideal time at the ideal place to the ideal subscriber.

SMSs may be used normally to provide premium rate services to subscribers of a telephone network, such as to deliver digital content: news, alerts, financial information, logos and ring tones. The first premium-rate media content delivered via the SMS system was the world's first paid downloadable ringing tones in 1998. Premium-rated messages are also used to collect money for charities and foundations, or for televoting services [3].

SMS usage as a marketing and corporate tool is analytically discussed at the 101 guide of [7] where most of the typical SMS based strategies are explained. Note that this typical usage has nothing to do with mobile applications for smartphones, though as we describe below SMS is an excellent way to make a blended tool for Mobile Web monetization. [7]

3 Monetization of Applications

Organizations and enterprises provide, in many cases, a wide variety of e-Services which include internet services and services for mobile devices. These services involve business and financial transactions as well as information services. Proponents of m-Services argue it can help make public information and services available "anytime, anywhere". An example of such beneficial use of mobile technologies would be sending a mass alert to registered citizens via short message service, or SMS, in the event of an emergency.

The arrival of smartphones brought the “application age,” a time period in which over the last few years approximately one million of third-party applications have come to market, and revolutionized consumer services in the mobile device industry. The success of third-party applications on mobile platforms has generated significant revenue for mobile carriers and developers. As the App market continues to grow and develop as an industry, monetization of the products and services it provides is becoming increasingly relevant. Monetization of an application can come in many forms, whether it is through charging for the App itself, selling virtual goods, or through in App advertisements.

3.1 Monetization Strategies

For developers who want to monetize mobile applications there are markets that provide endless opportunities for it [4]. There are four common strategies the developers use for this reason [9 - 10].

In-app advertising is a good way to monetize mobile apps for consumer apps which experience a high volume in use, or have a highly targeted audience. This allows developers and marketers to either take advantage of the large number of page views that come with frequent use, or the intrinsic value of a targeted user base to advertisers. Highly targeted mobile apps and some publishers are able to use ads to earn mon-

ey only from ads. It's possible to make money with mobile apps with individual advertisers; however going through an advertising company is easier and probably more profitable.

Paid Apps charge users a one-time fee for the use of an app. This is one of the longest standing strategies for app monetization, although it is quickly diminishing as a relevant strategy for all but the largest and highest quality offerings. From a publisher's perspective, charging a one-time fee for the use of an app can be a short sighted strategy. This arises from a two part problem: First, the install base of the application is limiting preventing it from reaching critical mass and viral growth. Furthermore, having already paid for the application once, consumers will not readily accept additional charges from within the application. Consumers paying for apps, have expectations of higher quality. If their expectations fail to be met, the app can suffer from bad user reviews or decreased engagement over time.

In-app purchasing and transactions involve developers using virtual stores inside the application that sell everything users might need. This may become the main provider of revenue. For example, 90% of Farmville's revenue (the popular Facebook app) comes from in-app purchases. Virtual goods present an additional avenue of monetization, one which has less of an impact on the user experience than advertisement. Utility (goods which make the users life easier) and Vanity goods (items which allow users to show off) both present an opportunity to monetize user interaction within an app. Developers can create consistent revenue, especially when the consumer spends often small amounts of money instead of paying once for the application.

Subscription models are cases where a customer is granted access to a product or a service after paying subscription. The subscription model helps developers keep their customers, by building loyalty. A common idea is to provide content for free, but restrict access to premium features. Great approaches may prove to be free offers or monthly trials. One of the most important aspects of ensuring success with this strategy is to minimize customer turn-over and acquisition costs.

According to a recent Mobile Developer Report survey [11], conducted by mobile development framework maker Appcelerator and market research firm IDC in July 2011, mobile developers are still divided on how best to monetize mobile apps. Among the 2,000 developers surveyed, a full 50 percent ranked attracting new users who buy software from an app store as a top priority going forward, down from 59 percent earlier that year. Another 50 percent ranked in-app purchasing as a top business model, up from 42 percent earlier that year. IDC suggests the change represents a shift in how mobile developers attract and retain customers. [12]

SMSs consist a competitive alternative that can be applied to any of the monetization strategies presented above, thanks to its adaptability: (a) in places were internet is not available, the mobile app can still refresh content through SMSs and (b) SMSs 'push' capability makes them suitable for transactions, subscriptions, or even in-app advertising.

3.2 SMS Advertising

SMS advertising provides a cost effective method of targeting promotions to specific customer profiles. One might want to remind customers of specific events or promotions, but for whatever reasons, SMS allows passing information directly to the right customer at very affordable prices and fast delivery.

Many companies now utilize this popular communication tool to boost sales and increase profit. Some representative examples follow: (a) an auto dealership's service department could generate substantial add-on revenues by sending customers scheduled SMS notifications for periodical services (e.g. oil changes), (b) the customer of a parking company could be charged for the obtained parking ticket via a mobile application using premium SMS services, (c) a radio station company could profit by publishing daily contests based on SMS premium, (d) a mobile application could inform customer for current prices of nearby gas stations. The last three examples constitute the case studies that are described analytically in following section.

3.3 Premium-rated SMSs

The premium-rate numbers are typically “short codes” – shorter than usual phone numbers. Each country and carrier regulates short codes different, but usually an oversight body issues the short codes for a fee. In the United States, for example, a dedicated short code may cost $1,500 to set up and then $1,000 per month. A shared short code where the message must be preceded by a keyword can be obtained for $50 per month. When calling or sending an SMS to a short code, the caller is billed a premium rate above the normal cost of an SMS or phone call. The revenue is then shared by the carrier, and the SMS aggregator. Unfortunately, premium-rated SMS services constitute a prosperous ground for attackers to monetize mobile platforms via malware [8].

4 SMS Monetization: Business Opportunities and Metrics

As mentioned before, many works study the ways mobile applications assist, but they all assume that people involved have access to internet connection and unlimited resources to dispose. However, this is not always the fact, as recent explosion of mobile data traffic indicates that plans that provide unlimited data usage are financially unsustainable. Thus, a mobile app provider should take into account all available technologies for mobile communication and data transfer and all possible monetary costs for customers, when developing a mobile app. This would be of great importance to mobile app selling companies, since two of their primary goals are (a) maximizing customer satisfaction by decreasing customer costs and (b) generating additional revenues. Cost minimization for providing basic services through mobile apps, could release space for the advent of special or added value services, where companies could profit using premium SMSs for charging customers.

At first, we take a closer look to the available technologies for mobile communication and data transfer and present the three dominant: SMS, GPRS and Wi-Fi/ADSL Technology. Thereafter, we present a set of metrics to calculate the overall data vol-

ume for a ‘message’ transmission, as well as the corresponding monetary cost for end users, depending on the data transfer method used. Pre-calculating costs is an important step in order to develop the appropriate mobile application that will exchange data using the suitable data transfer method. This potentially leads to minimization of user data access costs and allows new margin for monetization of apps and earnings for the carriers that maintain huge data access infrastructures for peak time coverage.

4.1 Available Architectures for Mobile Communication

One of the main functions of a mobile application is the exchange of data with a web service, and depending on the technology used for the data transfer, three discrete architectures arise, which are briefly described below.

In the 1st architectural approach (Fig. 1), the mobile application sends data to a web service using one or more SMSs. The SMS server receives the SMSs sent through the Mobile Telecommunications Provider and transforms their content to a request to the web service.

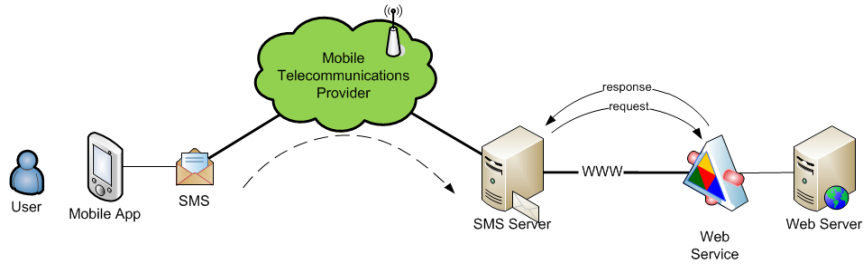

Fig. 1. SMS based Transfer Architecture

In the 2nd architectural approach (Fig. 2), the mobile application is connected to the internet through its Mobile Telecommunications Provider, using GPRS technology. After the connection is established, the application sends data directly to the web service.

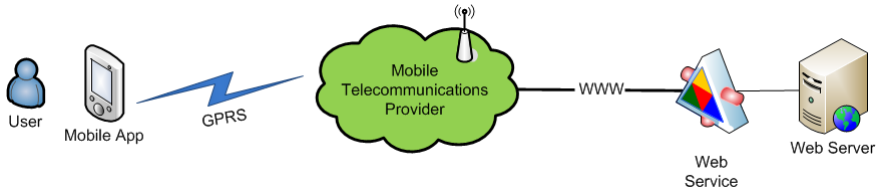

Fig. 2. GPRS based Transfer Architecture

In the 3rd architectural approach (Fig. 3), the mobile application exploits the established ADSL internet connection and the existence of a wireless router. Data are sent to the wireless router using Wi-Fi technology and then are forwarded to the web service through the ADSL Internet Provider.

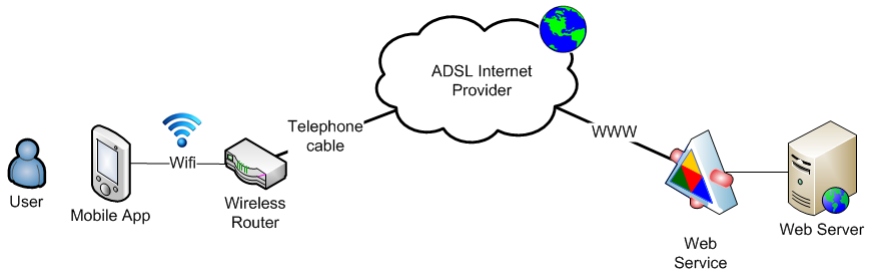

Fig. 3. Wi-Fi / ADSL based Transfer Architecture

4.2 SMS Monetization Utility Metrics

Considering the case a mobile application must exchange data with a web service, the overall data volume for a 'message' transmission, as well as the corresponding monetary cost for customers must be computed. To serve this purpose, a set of metrics is defined below..

Let $V_{MESSAGE}$ be the overall volume of a message and $C_{MESSAGE}$ be the cost of the message sent. Then, depending on the data transfer method used (HTTP or SMS), two metrics can be defined for the computation of $C_{MESSAGE}$. If the SMS method is used:

$$C_{MESSAGE,SMS} = \lceil V_{MESSAGE} / ch_{SMS} \rceil \cdot C_{SMS} \quad (1)$$

where C_{SMS} is the current cost of sending an SMS and ch_{SMS} is the maximum number of characters of the SMS. If the HTTP method is used:

$$C_{MESSAGE,HTTP} = V_{MESSAGE} \cdot C_{BYTE} \quad (2)$$

where C_{BYTE} is the cost of sending a byte using mobile internet. The measurement unit for data volume ($V_{MESSAGE}$) can be bytes or characters, depending on the data transfer method (HTTP or SMS correspondingly).

Depending on the data volume a mobile application exchanges with a remote service, companies can calculate overall monetary costs for their customers for monthly service usage. Pre-calculating costs is an important step for companies, in order to develop the appropriate mobile application that will exchange data using the suitable data transfer method. The mobile application can be set to exchange data using HTTP or SMS transfer method, or even a combination of both, depending on the current needs, having as a further goal to minimize transmission monetary costs for end users. The metrics described above can contribute to a rough cost calculation and cost minimization.

Cost minimization for providing basic services through mobile applications, could release space for the advent of special or added value services, where companies could profit using premium SMSs for charging customers. Profits can be computed using the following metric:

$$C_{MESSAGE,SMS\_premium} = \lceil V_{MESSAGE} / ch_{SMS} \rceil \cdot C_{SMS\_premium} \quad (3)$$

A specific percentage of this amount is received by the mobile telecommunication provider, and the rest of it is received by the mobile application selling company.

5 Case Studies

5.1 Strategy 1: The Case of Minimum Data Monetization - Parking Tickets

Numerous mobile applications have been developed to address the problem of locating a nearby parking place while driving and being charged electronically when occupying it. End-users download and install these applications in their mobile devices and submit once information necessary for charging. Two interesting aspects that arise are (a) the minimization of user input in order to enhance user experience and (b) the monetization of the mobile application in order to generate substantial add-on revenues for the parking company.

As far as the first issue is concerned, ordinary mobile applications would probably ask the user to provide information (mainly by typing) about the place, duration and phone number in order to be charged for the parking place. Alternative solutions that satisfy the first goal would use GPS technology to locate the vehicle position, minimizing this way user input to a data field for 'parking duration'. The selected parking place could also be determined through QR code technology using the mobile device's camera, in cases GPS is not an option. These solutions simplify the application interface and contribute to the enhancement of user experience.

Coming to the second issue, the mobile parking application could use SMSs to send and receive data with the SMS parking service. In this case study (Fig. 4), SMS is the most suitable solution for data transfer since it is unknown if any other technology would be available in every open space. Data could be sent using premium rated SMS, thus generating add-on revenues for the parking company. Moreover, customers could be charged extra if they enable additional services, such as SMS notification when about 15 minutes have left until the parking session expires.

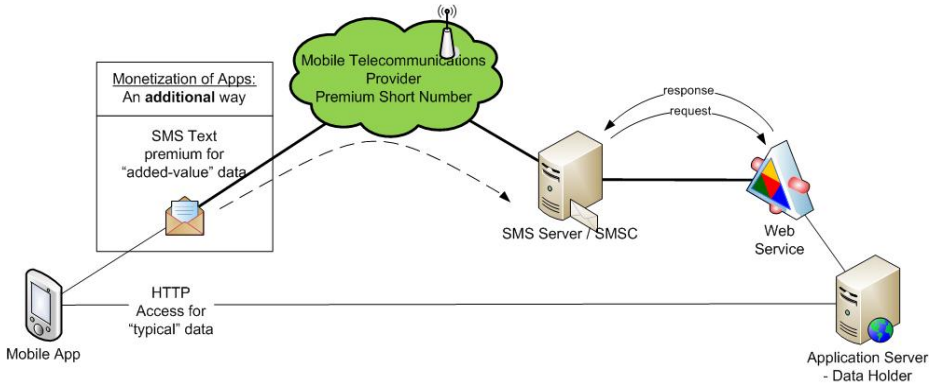

Fig. 4. SMS based Monetization of Apps: Proposed strategy 1.

5.2 Strategy 2: Blended Case Premium SMS and Data Intensive HTTP

A notable number of gas station applications for mobile devices are available in the markets and stores. Drivers download and install such applications to their Smartphone and while on road, the application, exploiting drivers' current location through GPS technology, receives and presents a list of nearby gas stations. The list is available to the mobile application on user demand.

This approach requires the use of HTTP transfer protocol and unlimited data usage plans for the user to be able to afford constant update of the available data for the application. With the recent explosion of mobile data traffic, it is obvious that such an allowance is unsustainable. There is need to wean subscribers from these data plans without provoking customer dissatisfaction. This can be achieved with data plans at different price levels, consist with subscribers' needs for data volume, quality of experience, and usage characteristics. [1]

This challenge can be faced effectively by incorporating SMS text delivery as a transport protocol and premium SMS text. (Fig. 5) In order to minimize download costs, a competitive application may include the list of gas stations on initial download, and present only the nearby ones based on driver's location. The application may also already include the location of the gas station as Point of Interest (POI) on a map.

However, as the cost of gas continuously changes, an SMS text based service may inform the user for the current prices of the nearby gas stations. Locating the gas station with the lowest gas prices would be of most convenience for the driver. The application would only need a couple of SMS responses with prices of the requested nearby gas stations. This service could be billable and the user would send a micropayment through SMS, to activate it and receive information.

Similar to our first case study, SMS is the most suitable solution for communication between the mobile application and the corresponding web service and for data transfer, since it is unknown if any other technology would be available in every open space. In fact, such cases show that there is room for completely avoiding the use of HTTP as a transport protocol in mobile applications and transfer all data through SMSs, which means implicit monetization whatsoever!

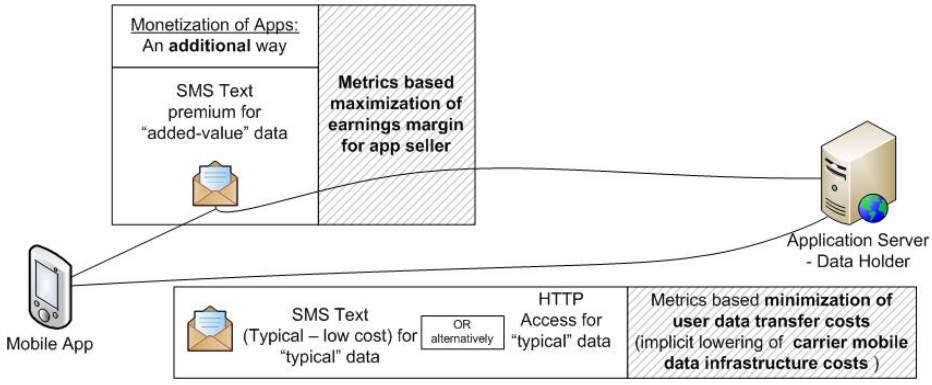

Fig. 5. SMS based Monetization of Apps: Proposed strategy 2.

5.3 Strategy 3: in-bound: HTTP, out-bound: SMS

It is not unusual the case where radio station companies offer mobile services to their audience through applications for mobile devices and smartphones. Users are able to receive radio program, announces or even tweets from their mobile application, using HTTP protocol or SMSs to receive content. These services are usually available free of charge. Additional services that the radio station company would offer to users of its mobile application would be the conduction of daily contests with monetary or other kind of prizes. Audience could participate to the contest by sending a premium SMS with the correct answer to the contest question.

6 Experimental Evaluation

The performance evaluation of our proposal is presented in this section through the presentation of an indicative scenario and the application of the proposed metrics. Our scenario concerns a mobile app which presents information for points of touristic and cultural interest (POIs), following user request and data exchange with a web service. This information consist the basic service offered by the mobile app (Fig. 6a).

The two dominant ways of data transmission are the (i) SMS and (ii) HTTP transfer methods. The format of the transmitted data may be one of the following: (a) simple form which consists of comma separated values, (b) parameters that are assigned with values, which is also a relatively simple form and (c) data encoded in XML format, a fully descriptive alternative. In our scenario, the third transmission format was used, due to the fact that it constitutes a machine readable solution and produces messages of larger volume. The corresponding message received by the mobile app would be:

```
<Points>
  <Point>
    <Name>Name</Name>
    <Type>Type</Type>
    <Description>Description of 200 chars</Description>
  </Point>
  <Point>
    …
  </Point>
  …
</Points>
```

Our message (3 POIs were considered) consists of approximately 850 characters ($V_{MESSAGE}$). If the SMS transfer method is used, ch_{SMS} = 160 (GSM 7-bit) and C_{SMS} = 0.06€ (average SMS cost in Greece) and according to Eq. (1) $C_{MESSAGE,SMS}$ = 0.36€/request. If information is requested 10 times/month, the overall cost is approximately 3.60€/month. When the HTTP method is used, due to mobile telecommunication providers' policies to offer daily or monthly mobile internet packages, the $C_{MESSAGE,HTTP}$ doesn't exceed 3€ for data traffic up to 60MB/month, while $V_{MESSAGE}$ for our example is 2250 bytes/request (due to HTTP overheads) or 22KB/month.

The application provider, in order to enhance user experience, adds an added value service to the mobile app, which presents information about special discounts or offers in the locations the end users are interested about (Fig. 6b). User explicitly re-

quests this service (by pressing a button) and the mobile app receives the information using premium SMS charge. The information is directly presented through the mobile app and not as a set of SMSs in the mobile device.

Using the procedure presented above and applying Eq. (3), application providers can make an estimation of the profits gained from the extra service.

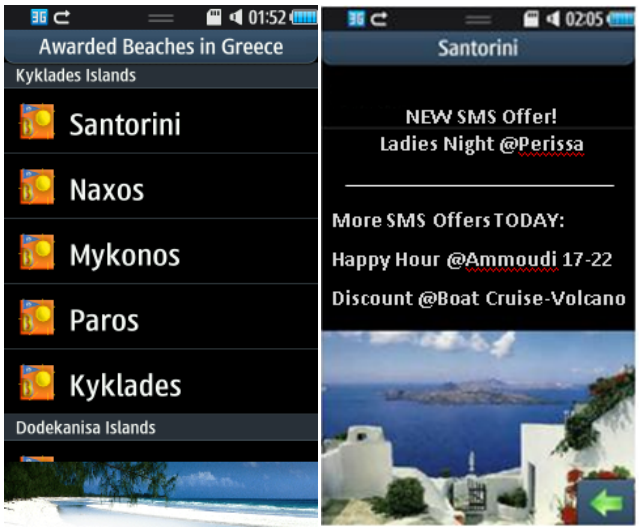

Fig. 6. Prototype of Business APP for touristic industry using SMS networking alternative

Our scenario was tested and evaluated in small scale, from students of the Computer Engineering and Informatics Department, concerning POIs in Patras city. The overall satisfaction grade for the services (on a scale of 5 = very satisfied to 1 = very dissatisfied) ranged from 4.0 to 5.0, with an average value of 4.8. Users evaluated the application as very easy to use and embraced the capability for content availability anywhere and with small costs.

Although this is an indicative scenario, the methodology proposed is general and can be used in any different scenario and with various data plans and different network connections. Taking into account national charges of mobile telecommunication and internet providers, it is clear that for large data volumes (approximately 50,000 chars) the HTTP transfer method is advantageous compared to SMS. On the other hand, SMSs can be a cost effective solution either for small all large data volumes if a suitable economic SMS package is chosen.

SMS text messages usage constitute a communication solution even when internet is not accessible, or when mobile end users prefer not to enable internet access in certain locations due to their limited data plans (packages with few MB available).

7 Conclusions and Future Work

While mobile traffic constantly increases, mobile data plans as provided currently do not allow revenue to grow in proportion. At the same time, the demand for network capacity is defined by busy hour traffic load. The need for exploiting all the available means of data transmission to avoid hardware costs is apparent. The proposed strategies for monetization through SMS are easy and simple solutions to this issue. SMS usage is important to monetization of mobile web also for those who have no easy access to credit cards (developing countries, youngsters) and for those that do not have satisfactory data coverage either in financial or connection terms.

Our proposed strategies and metrics present an efficient alternative to monetization of the Business APPification trend. Business APP Developers, like the ones of the well-known application “Angry Birds”, have already figured out some ways to monetize through SMS text messages. In this paper, we discuss "the bigger picture" and present organized strategies and metrics to provide tools for business APP developers to maximize revenue while using SMS text messages..

Future work includes metrics refinement to deal with issues of data fragmentation and SMS bill payments for the carrier side.

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