

# EVALUATION OF PARKING M-PAYMENT IN THE REPUBLIC OF CROATIA

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## ABSTRACT

The development of mobile networks and the sudden increase in the number of users enabled and gave incentive to a number of practical examples of charging the traffic services. In bigger cities in the Republic of Croatia several projects have been started regarding service charging via mobile networks, i.e. mobile phones. One of the significant projects, aimed at improving the parking system has been implemented by the Hrvatska parking udruga (Croatian Parking Association), and it refers to the payment of open-space parking services. The work evaluates the set-up system and the given frame projections of the development of the system with new applications.

## INTRODUCTION

According to the available data almost 9/10 of the total number of the population lives today in the cities, and there is a tendency that this figure will grow. Parallel with the increase in the number of inhabitants, the level of motorization is increasing as well, and this causes numerous problems related to the traffic in cities. The problems in big cities are reflected in the lower traveling speeds of the public transit vehicles, reduced safety of the traffic participants, congestion in the automobile traffic network, increased noise, air pollution, lack of adequate parking spaces and other secondary effects. In order to alleviate the existing traffic problems, especially in city centres, it is necessary to define an adequate traffic parking policy.

Car Park business has different aspects and points of view, such as management, operation, maintenance, customer relationship, and so companies involved in this business use different systems, tools and procedures to resolve different problems related to those different aspects. Hrvatska parking udruga (Croatian Parking Association) was founded in 2001 with the aim of improving the parking system in the Croatian cities. At that time parking was charged either by purchasing tickets or by using the ticket-issuing parking machines set at certain locations within the charging zones. The pilot project of charging the parking fees by means of mobile phones started on 11 September 2001 under the title "VIP parking". The technology of mobile networks and the increasing number of mobile telephony users has led to the idea of using the technology in an intelligent way and of providing the users with a simpler method of paying the parking fees. The advantage of the charging system in the Republic of Croatia is the SMS service, widely accepted by the users and available on all the mobile phones today.

During the last decade, there have been great changes on the telecommunication market. The wave of market changes has not avoided Croatia either and it is reflected most of all in the opening and liberalization of the market. This has created an environment in which the user has a choice of a wide range of different telecommunication services.

Competitiveness in the field of mobile telephony opened up a new era in the development of Croatian telecommunications, and also in the development of the Croatian economy in general. In October 1990, the public network of analogue mobile telephony MOBITEL, operating on the NMT 450 standard, started to operate experimentally and in January 1991 began its commercial operation. In August 1995 started experimental operation and in March 1996 commercial operation of the public network of mobile telephony CRONET, operating on the GSM standard in the frequency range of around 900 MHz. On 7 September 1998 VIP Net GSM d.o.o. was granted concession to develop the second national GSM network, thus becoming the second GSM operator in the Republic of Croatia.

Figure 1 presents the number of mobile telephony users which shows that the penetration into the market of mobile communications exceeds 50 percent which additionally justifies the introduction of the service charging via mobile phones.

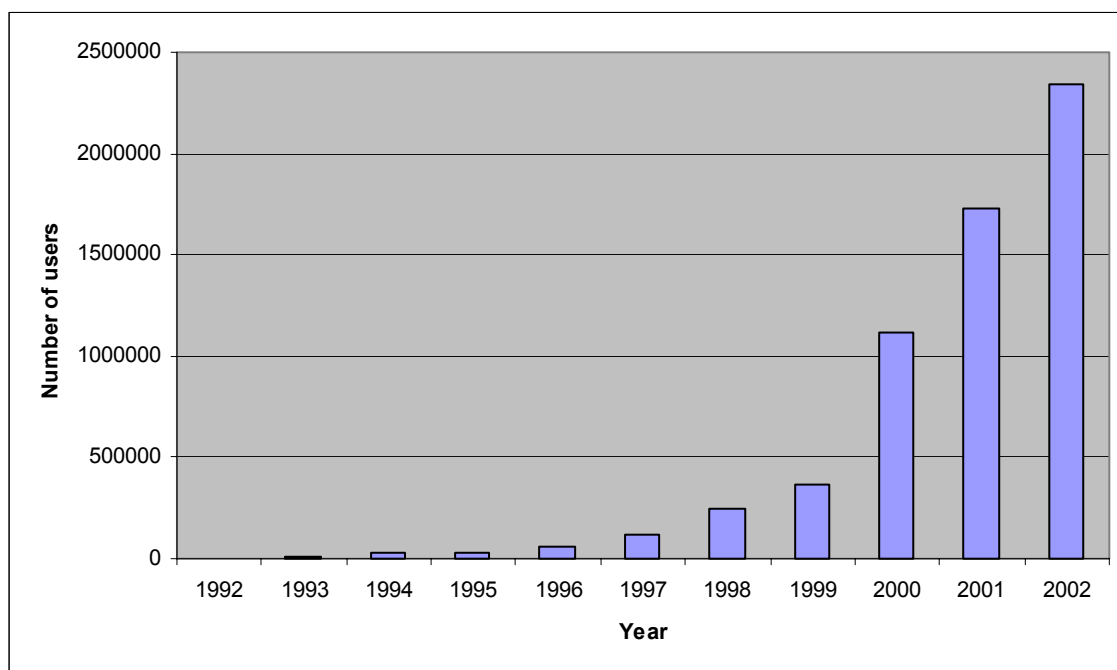


Figure 1 – The number of mobile telephony users in Croatia

Unlike today's environment in which the service providers are the elements of the network infrastructure, the emphasis will probably lie on the introduction of services into the users' terminals, and the network will only serve for the transfer of program mediators in between.

### **PARKING AS URBAN TRAFFIC PROBLEM**

By analyzing traffic problems in the cities, one can very soon conclude that finding a parking space for the vehicle is if not the main, but then certainly a very significant problem. The majority of people still want to get all the way to the door of the shop, entrance to the theatre, etc. in their cars. Furthermore, the house-building in the central city zones had not always been conditioned by the construction of underground garages, and thus the parking requirements have increased many times. To pay or to have permanent subscription to a parking place and a number of other possible options in the modern telematic environment have become a reality in the Croatian cities.

The studies carried out in the City of Zagreb have shown that approximately 10 percent of vehicles drive (circle) in the central city zone looking for a space. Fast and efficient charging, as well as the whole administrative and legislative part of charging and charging control are extremely important.

In the city of Zagreb, as well as in other Croatian cities the need has been noticed to integrate the charging system with the whole traffic process management. From this aspect it is extremely important to harmonize the charging also with the Parking Guidance System and the Urban Traffic Control, with the aim of optimal real-time traffic process management.

## CONCEPT OF M-PARKING SYSTEM

Although the pilot project was initiated through a co-operation with the VIP-Net operator, the second mobile telephony operator joined through the concept of unique m-parking payment system and parking control by means of mobile phones on the whole Croatian territory in 2002. The system is based on the today popular short messaging service (SMS) which is simple and acceptable from the users' point of view.

M-parking system consists of several elements, which is presented in Figure 2:

- users,
- mobile operators,
- Croatian Parking Association,
- parking operators, and
- controllers.

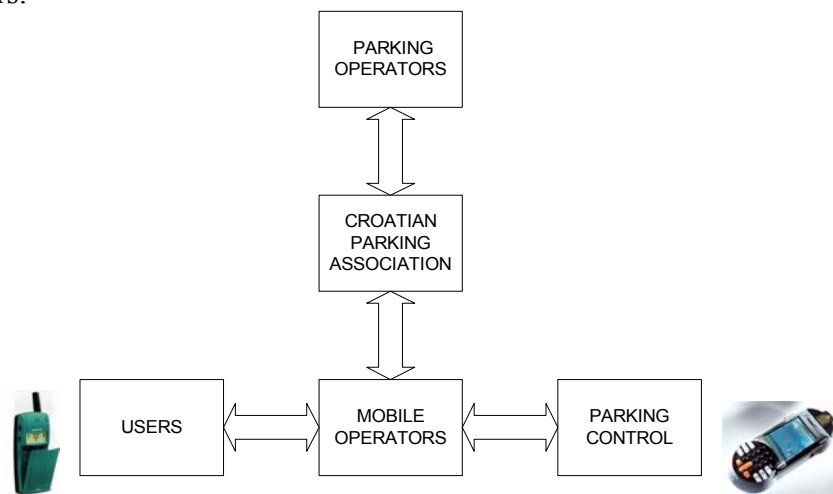


Figure 2 - M-parking system concept

Parking payment by means of mobile phones is a unique payment system in the whole country. It allows simpler and faster payment<sup>1</sup> for using the parking space via SMS message, which does not require previous announcement or registration of the users. Regarding the wide coverage of towns by useful radio-signals, the service is available everywhere.

The drawback of the system as compared to the ticket payment or payment by means of parking meters is that the user pays a higher price since the parking fee is increased by the cost of sending the SMS message. Considering the example of the city of Zagreb, the parking fee in the red zone (the most expensive one) has been increased by 2.5 percent, whereas in the green zone (the cheapest one) it has been increased by 10 percent.

<sup>1</sup> It was reported by a marketing research that 45% of the users had a very positive experience and 41% a better than average experience with the service (3).

## IMPLEMENTATION OF M-PARKING IN CROATIA

The pilot project of the mobile parking system started in 2001 in the city of Zagreb through the co-operation between the Zagrebparking d.o.o. company and the service provider VIP Net. During the first month of operation the service covered 8,363 parking service charges. During October 2003, in all Croatian towns included in the system, the total number of transactions was 379,381, which is presented in Figure 3.

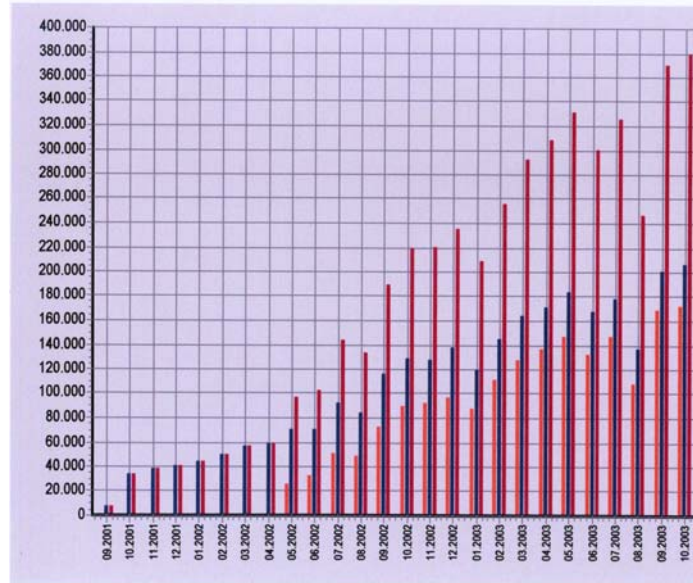


Figure 3 - SMS charging



Figure 4 - Towns included in the m-parking service

Source: Croatian Parking Association

Regarding the exponential tendency in the number of service users, m-parking today has a share of about 40 percent in the charging, 52 percent of users use parking meters, and parking tickets have a share of about 8 percent.

## **FUTURE DEVELOPMENT**

During the recent years, several underground parking garages have been constructed in the City of Zagreb which offers charging systems by means of machines different from the open-space parking ticket issuing machines. In order to simplify the method in which users are charged their parking fees, the plan was to enable parking payment by mobile phones in closed spaces as well. The problem here is not a technological one, but rather economic, that is, administrative. The open-space parking operator is a single operator, whereas parking garages are owned by other companies or houses. One of the possible solutions is the integration of the overall parking payment both in open and closed spaces by using the unique network architecture and payment technology by the users with specific ownership shares and division into localities. The subsystem of instructing, that is, distribution of vehicles into free parking spaces is a possibility that additionally controls and may balance the supply – demand problem in order to satisfy the capacity requirements of the overall road network.

Further development of the service oriented towards optimizing the operation is for:

- a) parking operators - connecting (wireless) of the parking controller with the central server for the registration of issued tickets, issuing of fines, control of the databases on parking users with special benefits (residents and companies located in the parking zones), control of the database on reserved spaces, etc.;
- b) users - introduction of WAP and the Internet services in order to provide the user with the necessary information at any moment, the possibility to realize their rights, make payments, etc.;
- c) town -
  - automated control of traffic and stationary traffic, guidance to free parking spaces (both in open and closed areas), etc.;
  - producing traffic statistics in order to improve the quality of management with (insufficient) number of parking spaces (progressive tariffs, different tariffs during the day, etc.);
- d) government -
  - introduction of a similar (same) method of parking lot management in all the towns (tourist orientation – to provide similar conditions for foreigners in all the towns);
  - introduction of special parking benefits (for tourism – tourist parking tickets – e.g. for Istria or Dalmatia);
  - linking to registries at the Ministry of the Interior (registered vehicles, stolen vehicles, presence, etc.)

## CONCLUSION

Experiences in introducing advanced parking payment methods indicate the need to provide a maximally simple and acceptable system for the service users. The development of mobile communication systems allowed the application of mobile phones as the means for realizing the parking fee payment. The exploitation experiences in the Republic of Croatia indicate the justification of introducing the m-parking system since it has been so well accepted by the users. The charging system needs to be harmonized with other ITS subsystems in the city, since payment weighting is possible already in the introduction phase and vice versa – by changing the tariffs and payments the supply and demand of the overall traffic management are weighted. By changing the tariffs over time it is possible to reduce or increase the pressure exerted upon the traffic process serviceability.

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