

A METHOD OF PERFORMING A PARKING TRANSACTION

BACKGROUND AND FIELD OF THE INVENTION

5 This invention relates to a method of performing a parking transaction, particularly but not exclusively, for performing a parking transaction using mobile devices over a data network.

Parking services are offered to a motorist or a vehicle owner (user) for parking
10 their vehicles and these services can be found in, for example, shopping complexes, buildings, residential areas and offices buildings. These parking areas may comprise open or enclosed vehicle lots.

In a public parking situation, users presently have various forms of payment for
15 example, using a stored value card that is inserted into a smart card reader, a parking coupon or cash at a parking meter. In the former two situations, the user has to purchase the stored value card or the parking coupon in advance for use at the point of parking the vehicle in the public parking area. In the case of a cash parking meter, the user would typically require the correct change for
20 making the payment.

As for the parking operator (i.e. the party that has the right to collect payment for the parking area utilised), the above two situations require that the operator install corresponding equipment that can read the stored value cards or sell the

parking coupons. In the case of cash parking meters, regular collection trips are required to empty and collect the cash from the meters.

Using the above payment methods, there are some problems envisaged and
5 these can be divided into two groups, those faced by the user and those faced by the parking operator.

Concerning the user, when a parking coupon is used, the user is required to utilise the entire coupon value even when he may not need the entire duration
10 covered by the parking coupon. Another disadvantage of using a coupon based system is that a user would need to purchase the coupon beforehand or has cash in small denominations or loose change if he wishes to purchase from a coupon dispensing machine. When the user does not have a coupon or small denominations, the situation can cause considerable inconvenience to the user.

15

In the situation of payment using stored value cards, or other electronic cash, the user must (a) purchase the card; (b) install an in-vehicle card reader and (c) top-up the value in the card when the value is low. The payment by electronic cash and stored value card does resolve the issue of exact payment for the time
20 and space utilised, but presents the user with additional costs to bear upfront and the inconvenience of having to top-up the card regularly at specific top-up locations.

There have been proposed methods for payment of public parking such as providing the user with a stored value parking device as undertaken by the Finnish city of Helsinki that can be rented by the user, but this again requires the user to have a device that is specifically used for parking purposes only.

- 5 Further, the value stored in the parking device cannot be used for payment of other transport-related services for example, for use in a bus, taxi or a train system.

Concerning the operator, the biggest disadvantage is the large upfront capital
10 outlay in establishing and maintaining the current payment systems for parking services. For example, a stored value in-vehicle card reader may cost US\$200 to US\$300 per device, while each smart card may cost US\$3 to US\$8 per card depending on the type of card and the smart chip memory requirements. When such costs are added up, the upfront investment to deploy such a system,
15 which requires deployment of equipment to either the user or a parking facility, becomes very expensive. Furthermore, if the parking system is cash based, then the regular trips required by the parking operator to empty and collect cash from each parking area adds another burden to operational costs..

20 As a result, high costs inefficiencies exist among public parking services. Typically, a public parking service is run by a government-linked, or government related agency that have to continually improve the quality of service on ever-reducing annual budgets. Unfortunately, maintaining existing public parking services and catering to expansion of more of such services require increasing

budgets. Not forgetting that public perception of an "unfair deal" when payment is made for parking time that is not utilised and without the ability to obtain a refund or the inability to transfer the remaining credit amount for payment of other transport services. Such perception may create a negative impression of parking operators.

There has been proposed a parking system that alleviates some of the above disadvantages, but such a parking system has its own disadvantage. For example, in such a parking system the user is required to register with the parking service provider and upon registration, the user will be issued a vehicle-specific identification device to be installed in his vehicle. This is primarily to facilitate the work of parking wardens such that they do not need to manually key in the vehicle information into a control device for issuing a parking fine. However, a disadvantage is that the user must be issued the additional gadget (identification device) for installing in user's vehicle. Such issuance of devices can be expensive and logistically difficult.

The proposed solution is also dependent on the type of mobile phone and the service offered by a mobile phone operator since the implementation disclosed by such a parking system is primarily focused on using Wireless Application Protocol (WAP). Such a parking system also suggests the use of Short Messaging Systems (SMS), but there is no disclosure to provide a solution to tackle the inherent lack of reliability and robustness of the SMS service.

It is an object of this invention to provide a method of performing parking transactions which alleviates at least one of the aforementioned disadvantages of the prior art.

5 SUMMARY OF THE INVENTION

According to the invention in a first aspect there is provided a method of performing a parking transaction between a user and a parking service provider communicating with each other using at least one communications network , the
10 method comprising the steps of, the parking service provider:
prior to a transaction using the method,
assigning an identification code to the user, the identification code being associated with a vehicle, and,
at the time the transaction occurs,
15 receiving the identification code and the request for parking from the user,
establishing the identity of the vehicle from the identification code, and
communicating with the user to confirm the transaction.

Preferably, the method further comprises the step of, supplying the information
20 regarding the transaction, on request, to a parking enforcement officer to enforce the parking payment.

Preferably, the identification code is a unique identifier given by the parking service provider to the user that enables access to the user's information records.

- 5 Preferably, a secret Personal Identification Number (PIN) is obtained from the user such that at the time of the transaction, the user confirms the transaction using the PIN.

Preferably, prior to a transaction, a telephone number of the customer is stored
10 in association with the identification code and, at the time the transaction occurs, the user contacts the parking service provider or be contacted by the parking service provider using the telephone number to confirm the transaction.

Typically, the payment method may be by a prepaid or stored value account,
15 credit card, debit card, bank account, a billing account such as a telephone or utility bill, or charge card and the step of communicating with the customer using the communications network may be via a mobile telephone link or via a fixed-line telephone network.

- 20 Preferably, the payment system is operated by the parking service provider themselves. Alternatively, the payment system requires a deduction from a bank or credit account and thus a payment authorisation is required from an external party, such as a financial institution. In the latter case, the method of performing a parking transaction may further comprise the step of obtaining a

payment authorisation for the confirmed transaction. This may involve the parking service provider communicating electronically with the respective third party depending on the payment method selected.

- 5 Preferably, a parking code is used to define uniquely a parking area, zone and/or a car park lot. For example, the parking code may use a three-digit area code and a two-digit car park lot number. There are various ways of communicating the parking code to the user. In a simplest case, this information can be placed on a sign or painted in visible areas at the parking lot.
- 10 Alternatively, a parking code may be communicated to the user electronically by using a Location Based Technology, for example the Global Positioning System or through a GSM mobile phone network – this reduces the need for the user to visually identify the exact parking space being utilised.
- 15 Typically, the identification code is stored in a central registry which may be provided by the parking service provider. Typically, prior to the transaction, the user provides multiple payment methods that are stored in the central registry and selects a preferred payment method. At the time of the transaction, the user may use the preferred payment method or selects a payment method for the
- 20 current transaction that is different from the preferred payment method.

The described embodiment also caters for a situation when a user extends the parking duration either by responding to an alert sent out by the system, or by initiating contact with the parking system to extend the parking duration.

Preferably, the user may also terminate the parking duration prematurely and have the remaining unutilised portion of the original payment, refunded to his payment account by initiating contact with the parking system.

5

According to a feature of the invention, there is provided to the user a method to enquire, top-up, transfer the remaining unutilized credit balance on the user's parking account with the parking service provider back to his account, to another user, or to another vehicle owner who may not be a registered user. By
10 communicating with the parking service provider through a data network on-line or off-line, the user may effect such modifications and transfers in a secure manner.

According to another feature of the invention, there is provided a method for a
15 parking warden to enquire and obtain information about parking payment transactions performed by a user in an individual or aggregated fashion, by a pre-defined area, zone and/or vehicle lot to allow the operator's personnel to effectively enforce non-payment situations. The penalty for non-payment may be by issuing parking fines on behalf of the parking service provider.

20

In yet another feature of the invention, there is provided a mobile payment infrastructure for parking and a scheme for issuing, purchase, transfer and redemption of electronic coupons or tickets which can be used on other public transport services such as a train system, electronic road tolls, taxis or buses.

Preferably, the mobile phone is a mobile device integrated with a telephony equipment such as a mobile Personal Digital Assistant, or such device that a user may find reasonably portable.

5

Typically, the communication link between the user and the registry is over a communications network such as the PSTN, GSM, GPRS, 3G, CDMA, the Internet or any other data network.

10 The invention also relates to an apparatus for performing the above methods.

Advantages of the described embodiment are as follows:

- i. A cost-efficient method of payment for public parking services. There is no requirement for the user to purchase and install any additional hardware,
15 software or card reader;
- ii. User-centric application that provides convenience of making the required payments, the ability to inter-changeably apply such payments for parking and other transport services, and the ability to fully utilize the remaining credit balance amount for public parking services;
- 20 iii. The central registry or payment processing system which defines the parking zones, vehicle lots and pricing can be dynamically set or modified by the parking service provider or operator depending on market demands;

iv. A central body which may be the parking service provider or the central registry is required for issuance, transfer and management of electronic tickets as a form of pre-paid payment method;

v. Co-existence with existing payment systems such as the coupon-based parking system. In addition, easy migration from existing payment systems to the proposed payment parking system according to the described embodiment.

It will be appreciated that the described embodiment (and the mentioned advantages thereof) is exemplary only and the invention is to be construed with reference to the appended claims without limit to the embodiment described.

BRIEF DESCRIPTION OF THE DRAWINGS

An embodiment of the invention will now be described, by way of example, with reference to the accompanying drawings in which:

Figure 1 illustrates a process of a user registering with a parking service provider via a central registry;

Figures 2A and 2B depict a process of the user making a payment for parking using a mobile phone and extending the parking time respectively;

Figure 2C depicts a process of a parking warden retrieving information stored at a parking service provider for enforcing the parking regulations;

Figure 3 provides an overview of the system architecture to implement the invention; and

Figure 4 provides a possible implementation schema of a database for a central registry.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

5

PART 1: REGISTRATION FOR PARKING PAYMENT SERVICE

A registration over the Internet by the user for the method will now be described. However, it will be understood by those skilled in the art that the
10 described method is equally applicable for use using other types of communication networks such as Wireless Application Protocol (WAP), or even an off-line registration interface.

The parties to the transaction are shown in Figure 1:

15 (1) Users (Customers):

Consumers that wish to use mobile payment for parking their vehicles in a car park.

(2) Central Registry:

A party which interfaces between the user and the parking service provider. The
20 central registry manages user registration and manages parking payments; and

(3) Parking service provider or operator:

The party who owns or has been engaged to operate car parks.

It is to be noted that in this embodiment, the functions of the parking service provider and the central registry have been separated, but the invention can also be implemented with the functions of the parking service provider and the central registry residing at the same location or as a single entity.

5

As illustrated in Figure 1; the process flow begins when the user registers for the parking system, at step 1.1, through either an on-line channel such as the Internet or by mobile phone; or through an off-line method such as filling in an application form and submitting the form to the parking service provider via the
10 central registry. In an on-line registration example, the user will provide details such as the user's mobile phone number, identification details, preferred payment method such as a credit card number, expiry date and issuing bank, and the identity of the vehicle such as a vehicle registration number, road tax payment identification or valid insurance identification. The user may also be
15 prompted to input a secret Personal Identification Number (PIN) which will be used to authenticate a future transaction. Upon receipt of such details at step 2.1, the parking service provider will initiate a call back via the central registry to the user's mobile phone to confirm the details of the registration. Alternatively, the user may be required to confirm the registration details on-line. The
20 confirmation may require the user to positively accept the registration either by input of a response code for example hitting the "enter" key, or by providing the PIN selected earlier, at step 1.2.

Once the registration has been confirmed by the user, the central registry will verify the details with the parking services provider or operator at step 2.3 where such details may be available. This will ensure that the details provided by the user are valid and can be used in situations where there is a parking
5 offence.

Upon verification of the user details, a database entry will be created at step 3.2.1 in the parking service provider's computer system as well as at the central registry. The parking service provider will return a unique user registration or
10 identification code back to the user and provide a visual confirmation of the registration to the user at step 2.4.1. The parking service provider may further provide a digital record of the registration that can be recalled by the user at any point in time and on-demand basis. When the user receives the identification code at step 1.3 or 1.4, the first part of the process is completed.

15

Once completed, the user's identification code is used to associate the user to the identity of the vehicle input earlier. The identification code can also be the user's mobile telephone number since the telephone number can also be used to identify the user as described below.

20

PART 2A: MAKING A PARKING PAYMENT

This part of the description provides details on the method by which a user makes payment for a public parking service. A transaction process for making

a parking payment using an Interactive Voice Response based system will now be described. However, it will be understood by a skilled man in the art that the described method is equally applicable for use with other user interfaces such as Wireless Application Protocol (WAP), SMS and SIM Tool-kit.

5

For the purpose of an illustration, it is envisaged that the user of the parking space has parked his vehicle at the chosen parking lot, and has selected to make the payment, as shown in Figure 2A. The user then calls a toll-free parking service number at step 1.1, or may be contacted by the parking service
10 provider (or central registry) if the user initiates a "hot-button" mobile message or sends an SMS for request of service, and will be led through an interaction that may request the user to choose a preferred language.

The first step in the transaction process involves identifying the user using his
15 unique user identification code. If the user's mobile phone number is used as the identification code, then "caller line identification (Caller ID) may be used to match the mobile phone number of the user's call with the database records. Otherwise, the user will be required to key in the identification code to identify himself to the central registry. Alternatively, in a WAP-type interface, the
20 identification code can be embedded into the user's bookmark so that on accessing the central registry's WAP site, the user will be identified to the system. Using the above methods, the user's identification code is received by the parking service provider immediately after a communication link is established between the user and the parking service provider.

From the identification code, the parking service provider is able to extract the details of the user which is stored in the database, which includes establishing the identity of the vehicle that is associated with the identification code and thus
5 also the identity of the user. Alternatively, the identification code can also be used by the central registry for the same purpose since the registration information is also stored at the central registry.

The user next indicates the end time of the parking and the required parking
10 area, by zone or lot number, at step 1.3. By speaking or inputting the ending time say "1420" on the mobile phone's keypad, the user can indicate the ending time and in this case it is 2.20 p.m. It will be understood by those skilled in the art that the user interface for the determination of the expiry time (and therefore the parking charge) may be varied according to implementation. In addition to
15 the method described above, the system may optionally allow a user to pay for parking based on predetermined time blocks such that when a user makes contact with the parking service provider, the parking duration is set immediately to a fixed duration, for example 1 or 2 hours. The duration of a time 'block' may be varied or pre-set by the user through a manual, automated
20 or a web enabled user service interface. In addition, the payment for such an implementation of parking by time blocks may be automatically renewed when the time is up and a new time block automatically charged to the user so that the user does not end up with an expired ticket. In this case, the user is then

required to communicate back to the parking service provider when he returns to his car and wishes to terminate the parking session.

As for inputting the parking area code, the user can speak or indicate the parking area to be, for example "10128", which represents parking zone "101" and "lot 28" as the parking lot. The parking zone and lot number to be entered can be displayed prominently on a signboard on entry into the car park area or strategically placed within the car park so that a user can see it easily.

Alternatively, if some Location Based Technology is used together with the parking system that can pinpoint the position of the user via the user's mobile phone, then this location information can be sent automatically to the central registry thereby removing the necessity of the user manually entering the car park area or lot number.

Upon receiving the above information from the user, the central registry can automatically compute the parking duration which is the difference between the time of making the transaction (initiated by the phone call to request for the user's identification) and the ending time specified by the user. This is performed at step 2.4 of Figure 2A. Based on the parking zone entered, the system will further retrieve a pre-defined parking charge associated with that specific parking area. The parking charge incurred by the user is then computed based on the parking duration and the corresponding pre-defined parking charges at step 2.5.

It is envisaged that the size of a parking area covered by a single parking area code is flexible and can be varied according to implementation. For example, one parking area code may be used to designate multiple physical parking zones in which case there will be a large number of parking lots represented by this parking area code. It should be apparent that, however, there is no difference in how the parking system functions.

To specifically identify that the user has paid for his parking charge, there are two possible implementation methods. In the description above, the user enters the specific lot number (lot 28 in the example above) in a parking zone. This indicates that lot 28 in the parking zone has been paid for. Alternatively, the user's vehicle may be parked in a parking zone (i.e. in any lot within the zone) and the central registry associates the payment with the identity of the vehicle that was entered by the user during registration. The identity of the vehicle may be the vehicle registration number.

Alternatively, the system may prompt the user to enter a vehicle number should the user wish to pay for a vehicle other than the one registered in the database record of the central registry or the parking service provider. In this case, the sequence of actions leading to the purchase of the parking payment would remain the same i.e. the user calls or is called by the parking service provider or the central registry and is subsequently identified. He is then prompted for a parking area code and the end time of the parking as usual. After the user furnished these details, he will be prompted whether he wishes to key in an

alternative vehicle identification number which allows the user to pay for another vehicle which was not submitted to the central registry or parking service provider during the registration process. This can be followed optionally by a PIN entry to confirm the transaction. In essence the flow remains the same as
5 before except for the additional input of the alternative car identification number in order to override the registered car details.

After providing the parking end-time and parking area (zone or lot) to the central registry, the user is then led through a standard payment process that is similar
10 to any face-to-face payment encounter. For example, the user may be presented with the details of the service to be paid for which may include the parking duration and payment amount for confirmation at steps 2.5 and 2.6. The user then confirms the details for payment by accepting the transaction by some conscious response to the system, for example hitting the return key on
15 the mobile phone at step 1.5. Alternatively, the user needs to provide the secret PIN number as a form of digital signature for the payment to enhance the security at step 1.6. The parking service provider (or the central registry) accepts the input from the user, and verifies its internal computer databases by retrieving the user's record based on the user's identification code established
20 earlier in the call. The system then verifies that for this user record the PIN entered matches with the PIN stored in the database. Once the match is confirmed, the system will accept that the transaction is genuine at step 2.9 and the transaction is confirmed.

It will be understood by those skilled in the art that the process of presenting the details of the parking payment back to the user, at steps 2.5 and 2.6, prior to confirmation is optional and may be omitted in certain implementations. It will also understood by those skilled in the art that the process of confirming the transaction may be implemented either by a conscious response through the mobile device, for example a keystroke, a spoken message for example, the word "yes", or a combination of a PIN and a spoken message.

Depending on the user's preferred mode of payment, say by credit card, the central registry will request electronically via the card processing network, for an authorisation of the confirmed transaction. This authorisation is a standard process for all credit card and debit card transactions as implemented by the global card associations. If an electronic payment authorisation has been obtained, the central registry then passes the parking information to the parking service provider. Alternatively, if the payment method used is not a card but a bank account or some stored value account, then the payment authorisation will be received via an electronic connection to a relevant bank, processing network or payment server.

Alternatively, the user is allowed to choose another form of payment which is not the preferred payment stored in the registry's records before the transaction is confirmed by the central registry. In this case, the user will be prompted for example, to select his desired payment method from a number of payment

methods available and the central registry upon receiving the request will obtain authorisation accordingly.

In a further alternative, the user may have a parking account with the parking service provider such that the parking service provider is the one authorising the payment. In this case, there is no need for the parking service provider to seek a third party to authorise the payment after the parking transaction is confirmed by the user.

- 10 A record of the parking payment charge and all the associated information, for example user registration code, date, time, duration, end time, parking zone, parking lot number, vehicle number, parking charge or parking rate may be entered into the central registry's database for each transaction. This record will serve as evidence that the parking lot number or vehicle number specified
- 15 (depending on implementation) has been paid for and the information can be accessed by a parking warden during his normal inspection. The record may also be used for accounting and reconciliation purposes to ensure that an audit trail exists to prove that payment was made for the specified duration on that particular date and time.

It should be apparent that the communications network used for receiving the identification code or communicating to the user to confirm the transaction may be the same or a different communications network. Similarly, the central

registry may use a different communications network when obtaining a payment authorisation to that used for communicating with the user.

PART 2B: EXTENSION OF PAYMENT OR PREMATURE TERMINATION OF

5 PARKING

A user may be prompted by the central registry to renew and extend a current parking session. Based on the information stored in the parking information table, the system will be able to determine, through a standard programming
10 technique that a user's parking session is expiring. The system will then be able to notify a user of this situation. A method of notifying the user is to perform an automated call through an Interactive Voice Response system to the user's mobile phone number which is retrieved using the user's identification code.

15

Alternatively, the user may keep track of the parking duration and before expiry of the parking initiates a call to the central registry to extend the parking service. Through a similar process for making a new payment, the user is led through an interaction that requests for the new ending time for parking as shown in Figure

20 2B.

After the authentication process described earlier, the user is asked for the new ending time at step 2.2. The user may also be prompted for the identity of the vehicle number if, for example, the user is paying for another vehicle not

registered in the registry's database. The central registry verifies the time, and presents the transaction back to the user for confirmation at step 2.7. Again, the user will be asked to accept or reject the transaction and may be required to provide the secret PIN as a form of digital signature for confirming the transaction.

The central registry verifies the PIN and similarly proceeds to requests an authorisation from the user's issuing bank to complete the transaction. The central registry may also provide an update to the parking authority's computer systems. A digital receipt of the transaction is presented to the user, and can be accessed by the user at any point in time. The parking enforcement officer or warden of the parking operator is kept updated on the extension of parking which is described in the next part of the description.

Figure 2A and 2B illustrates a payment for parking that can be performed by the user wherever the user is located. It is also a possibility that the user may be making a payment for another user's vehicle parked in another location.

In the case whereby the user arrives back to his vehicle before the expiry time of his parking payment, the parking service provider may optionally allow for the parking payment to be terminated early, and the resultant unused parking charge credited back to the user's payment account on a pro-rated basis.

This can be achieved by having the user initiate a call, SMS or a data connection to the parking system via his mobile device. Once the identity of the

user is established in a same way as when the user pays for a new parking, the system will be able to determine that there is an active parking payment entry in the database. The system then prompts the user through his mobile device, for a confirmation to terminate the parking transaction and if this confirmation is so received then it will compute the pro-rated unused payment charge and effect a credit back of the unused funds to the same payment account originally used to pay for the parking.

PART 2C: INSPECTION BY PARKING WARDEN

10

For inspection of parking payments by vehicles in a public parking zone, the parking enforcement officer or warden will typically carry either a mobile phone or some type of wireless handheld device for example, a mobile personal digital assistant (PDA). This communications device will allow the parking warden to communicate wirelessly with the central registry in order to retrieve parking payments for a particular parking zone being inspected. The device being used can either be customised for this purpose, or simply a general purpose device utilising a commercially standard messaging interface for example a browser, email or the GSM Short Messaging System (SMS). The wireless communication channel used can also be via a private data network or a public data network for example the paging, GSM, CDMA, GPRS or 3G network.

20

In the description that follows, the parking warden will be equipped with an industry standard PDA using a Windows CE type Pocket PC device and a

wireless modem utilising the GSM data network. However, it will be clear to those skilled in the art that other suitable devices can similarly be used.

When the parking warden performs parking inspections, the parking information
5 can be made available on-line upon request, or "pushed" through and refreshed onto the parking warden's mobile personal digital assistant (PDA) via any of the wireless communication channels described earlier.

Figure 2C illustrates a process of how the parking warden obtains the
10 necessary information to enforce the parking regulations.

At step 1.1, the parking warden calls or connects to the central registry so that his mobile device is connected to the parking information database. Access to this database can be restricted if necessary by any standard technique, for
15 example requesting a standard user ID and password login from the warden at step 1.2. The user ID and password are issued to the warden by the parking service provider or the central registry.

At step 1.3, the parking warden enters the parking zone number of the area
20 which he is inspecting, for example zone "101". It is to be noted that the sequence of steps is not critical as some implementations may have the parking warden entering the parking zone number into the PDA before calling or contacting the central registry. In the latter case, it is possible that the information needed to query the database (e.g. zone number) is obtained first

from the parking warden, and then the communication link is established, followed by a transmission of the query information to the central registry before the desired information response is received.

5 In steps 2.2, 3.1, 3.2 and 2.3, based on the parking zone number entered, the central registry and the parking service provider retrieves the associated records for all parking payment charges made for zone 101. As described earlier the information regarding the parking payment is kept in the database at the central registry or with the parking operator. The retrieved information is
10 then sent over to the warden's PDA via the wireless communication channel. This retrieval process also indicates to the central registry that the parking warden is presently inspecting the specified zone, 101.

With the parking payment information now available on his PDA, the warden
15 then begins his inspection through the individual lots.

If the parking system is run in conjunction with another parking payment system, for example a coupon parking system or parking meter, when the parking warden walks past an occupied parking lot, the warden will first check to
20 see if there exists a valid paid parking coupon or if the meter is paid-up. If the parking is valid, the warden simply moves on. If the parking system is standalone then the preliminary inspection of the coupon or meter can be skipped.

In the absence of a valid parking coupon or paid parking meter, the warden then proceeds to check with the PDA for the parking payment charge. As described earlier, there are two possible implementations for the system whereby the parking charge can be paid for by the specifying the lot number, or by vehicle
5 number.

In the case where the parking charge is paid with reference to the lot number, the parking warden's PDA may be customised to present the information as a graphical map of the parking area. For example, "Green" indicates that a
10 physical parking lot has been paid for, while a "Red" will indicate non-payment of the parking lot. In situations when an occupied parking lot is not paid, the parking warden will then issue a fine for the non-payment.

In the case where the parking charge is paid using the vehicle number, the
15 warden simply inputs the vehicle number being inspected into the PDA. The process of obtaining the vehicle number may be manual, for example the parking warden keys or writes the number on a keypad or touchscreen.

Alternatively, a voice recognition software may be used so that the warden speaks into a microphone on the PDA. In a further alternative, a digital camera
20 linked to the PDA may be used to scan the vehicle number and subsequently, character recognition software may be used to obtain the vehicle number. The PDA then searches the parking payment information for this zone retrieved earlier from the central registry, and displays the corresponding vehicle number, if available, within that parking zone that matches the entry made by the

warden. The warden will then be able to determine clearly if the vehicle being inspected has its parking paid for and if not, issues a fine.

While the warden is inspecting the specified parking zone, in this case zone 101, if there is any new parking payment made by users of this zone, the central registry will immediately update the parking warden's PDA records through the same wireless communication channel. This update can either be made through a persistent on-line link or a messaging link for example SMS.

10 It should be apparent that while the described embodiment proposes a new method of making parking payments, the process does not require any change in the interaction involved in issuing fines. Once a vehicle has been determined to be illegally parked in a parking area, the warden may issue the fine immediately and using any method that is commonly practiced.

15

PART 3: SYSTEMS ARCHITECTURE

The invention envisages an integrated end-to-end payment system for parking services. A systems architecture has been developed which illustrates the various core components from the perspective of (a) multi-channel access or customer "touch points"; (b) core applications such as user, parking operator, parking warden and central registry functions; (c) clearing and settlement interfaces to banks, card associations and clearing houses; and (d) security and systems management services.

The system architecture as illustrated in Figure 3 provides a possible permutation on the actual implementation of the mobile payment system for the parking service.

5 (a) multi-channel access or customer "touch points" 300: users will be able to access the service through Internet, voice interaction, digital text such as Short Messaging (SMS) and using devices such as portable computers, digital assistants and mobile phones.

(b) core applications 301 such as user, parking operator, parking warden and
10 central registry functions. These functions are basic services for users to register and utilise the mobile payment system for public parking and for parking operators and their personnel to administer and enforce parking payment requirements. The central registry's services may be an internal set of functions managed by the parking service provider or operator, or may be out-sourced to
15 a specialist third party service provider such as an application service provider or a facility management company.

(c) clearing and settlement interfaces 302 to banks, card associations and clearing houses: these multi-mode payment functions create a part of the compelling proposition of the invention i.e. users may choose to pay for parking
20 with payment methods of their choice.

(d) security and systems management services 303: these are functions that are a part of the central registry and states the need for high-level security. A variety of standard security protocols will be supported by the central registry and deployed depending on the type of user interaction and systems platform.

For example, Secure Socket Layer (SSL) and Secure Electronic Transaction (SET) are standards for Internet commerce, while Wireless Public Key Infrastructure (WPKI) and Wireless Transport Layer Services (WTLS) are industry standards for mobile commerce.

5

PART 4: IMPLEMENTATION DATABASE SCHEMA

The implementation of a database schema for this invention will link three key parties: the user (or customer), central registry and the parking authority or
10 provider.

As illustrated in Figure 4, central registry will be the key manager of such databases. The details of the user will include a parking account (for example a "TeleMoney parking account"), identification details (passport number, or
15 national registration number), mobile phone or mobile device number and payment methods (credit card number, bank account, expiry date). When a user registers for the mobile parking payment service, the central registry will create an entry into the database that records such a user. The central registry may have other functions which manage the validity or tracks of the user's
20 parking habits.

Information on the vehicle may include a history of public parking utilisation such as operator and lot number, date and time of parking, and the parking charge amount. These details are also created when a registered user begins

utilising the mobile parking payment service. For example, when the user parks a vehicle in a public parking area, an entry reflecting the payment for the parking zone will be created upon confirmation of the payment by the user.

- 5 A history of a user's parking fines may also be maintained as part of the central registry's function which includes information such as registered vehicle number, type of fine and amount. Such information will be entered when a parking warden on a duty round discovers non-payment by a vehicle owner. Users may access such information at the central registry and make payment of
10 the fine through the same mobile payment service.

A database of parking wardens and their respective duty rounds (both current and historical) may also be maintained within the system. This information can be maintained by the parking service provider or maintained separately by the
15 central registry.

From the described embodiment, it should be apparent to note the following unique preferable features of the invention:

- (1) Multiple payment methods for making payment: A user of this system would
20 have a choice of different modes of making payment such as a central account where the cash value can be periodically topped-up by user, on-demand payment or post-payment options;
- (2) Compatibility with standard mobile devices such as a SIM-chip mobile phone: off-the-shelf consumer products would be usable with such a system.

There is no need to download or install additional hardware or software at the user end;

(3) Multi-channel transaction access: users may choose to access the system using mobile phones that may be GSM, CDMA or WAP based, or through
5 other mobile devices such as a personal digital assistant;

(4) Multi-modal instructions: user may also issue instructions to the system through multiple ways such as text i.e. input from a touch screen or voice using voice recognition technology;

(5) Flexible and smaller payment time blocks: a user may choose pre-defined
10 time-blocks by stating the end-time for the parking. Instead of hourly or half-hourly parking time blocks, users may select to pay by the minute;

(6) No need for additional periphery for users: Unlike the prior art, users do not need an additional device to be placed at a clearly visible location in the vehicle to be used for parking enforcement. A parking warden or
15 enforcement officer is equipped with a standard mobile device such as a PDA that will be linked to the central registry using wireless means to access parking payment information;

(7) Integrated end-to-end parking payment system: The front-end payment device for this system is inter-linked with the central registry which is a
20 comprehensive system linked to payment clearing houses such as banks, and also to parking operators such as government parking agencies. This allows information to be captured and relayed seamlessly to the relevant key parties in the entire parking payment process.

Having now fully described the invention, it should be apparent to one of ordinary skill in the art that many modifications can be made hereto without departing from the scope as claimed.

CLAIMS

1. A method of performing a parking transaction between a user and a parking service provider communicating with each other using at least one communications network , the method comprising the steps of, the parking service provider:
prior to a transaction using the method,
assigning an identification code to the user, the identification code being associated with a vehicle, and,
at the time the transaction occurs,
receiving the identification code and the request for parking from the user, establishing the identity of the vehicle from the identification code, and communicating with the user to confirm the transaction.
2. A method as claimed in claim 1, further comprising the step of, on request, supplying the information regarding the transaction to a parking enforcement officer to enforce the parking payment.
3. A method as claimed in claim 1 to claim 2, further comprising the step of, the parking service provider obtaining a payment authorisation for the confirmed transaction.
4. A method as claimed in any one of claims 1 to 3, wherein prior to the transaction, a telephone number and the identity of the vehicle are stored

in association with the identification code of the user, and parking areas are systematically defined as specific parking zones and/or parking lots.

5. A method as claimed in claim 4, further comprising the step, at the time
5 the transaction occurs, of the user contacting the parking service provider or the parking service provider contacting the user using the said telephone number to obtain the user's parking details and/or parking duration.
- 0 6. A method as claimed in claim 5, wherein the user provides an ending time of the parking and the parking duration is computed from the said ending time.
7. A method as claimed in claim 6, further comprising the step, at the time
5 the transaction occurs, of the user contacting the parking service provider using the said telephone number to provide a new ending time to extend the period of the parking service.
8. A method as claimed in claim 5, wherein the parking duration is in the
10 form of a predetermined time block.
9. A method as claimed in claim 8, wherein the time block is automatically renewed until such time when the user contacts the parking service provider using said telephone number to terminate the parking service.

10. A method as claimed in claim 6, further comprising the step, at the time the transaction occurs, of the user calling the parking service provider using the said telephone number to terminate the parking service.

5

11. A method as claimed in any one of the preceding claims, further comprising the step, prior to the transaction, of the user selecting a preferred method of payment from a plurality of available payment methods.

10

12. A method as claimed in claim 11, further comprising the step of, at the time the transaction occurs, selecting a method of payment which is different from the preferred payment method.

15 13. A method as claimed in any one of the preceding claims, wherein the step of communicating with the user to confirm the transaction comprises the step of providing the identification code through a mobile communications device.

20 14. A method as claimed in any one of the preceding claims, wherein the identification code is stored in a central registry.

15. A method as claimed in claim 14, wherein the central registry is separate from the parking service provider.

16. A method as claimed in claim 14 or claim 15, wherein the central registry informs the parking service provider regarding the vehicle number and parking duration.
- 5 17. A method as claimed in any one of claims 14 to 16, wherein the central registry informs a payment provider or financial institution of a payment method for the purpose of seeking authorisation for the confirmed transaction.
- 10 18. A method as claimed in claim 17, wherein the payment method is a payment card, a bank account, a stored value account, or a billing account.
- 15 19. A method as claimed in any one of claims 14 to 18, wherein the central registry stores information representing parking zones and for enforcing parking offences.
- 20 20. A method as claimed in any one of claims 14 to 19, wherein the central registry stores information on parking payment transactions which are accessible on-demand by users.
21. A method as claimed in any one of the preceding claims, further comprising the step, after the said transaction, of the user or the parking

service provider and/or the parking enforcement officer accessing and viewing the parking payment transaction.

22. A method as claimed in any one of the preceding claims, further
5 comprising the step of using a PIN to authenticate the user's request for a parking service before confirmation of the transaction.

23. A method as claimed in any one of the preceding claims, wherein the communications network is a data and/or voice network.

10

24. A method as claimed in claim 23, wherein the data network is the Internet, GSM, GPRS, 3G, CDMA and/or a mobile telephone network.

15

25. A method as claimed in claim 23, wherein the voice network is a wired or a mobile telephone network.

26. Apparatus for performing the method of any one of the preceding claims.

20

27. Apparatus according to claim 26, comprising a GSM, GPRS, WAP, CDMA, 3G and/or any type of mobile phone.

28. Apparatus according to claim 27, further comprising a mobile personal computer, or a portable personal digital assistant.