

MOBILE SYSTEM OF TELEPAYMENT OF ACCESS RIGHTS
TO SERVICES FOR USE BY MOTORISTS,
RENEWABLE REMOTELY BY RADIO PAGING

Technical Field

The present invention relates to a mobile system of telepayment of access rights to services for use by motorists, renewable remotely by radio paging, used for
5 services dedicated to paying parking, for example on the roadway, and/or teletolling, for example for passage through the toll booths on motorways.

State of Prior Art

10 A prior art document, reference [1] at the end of the description, describes a system for counting the time, especially for counting the length of time in a paying parking. This system essentially comprises: :

- a smart card in which each memory position can
15 be inscribed individually and irreversibly, each of these positions corresponding to a credit of units of time allotted against pre-payment of the card;

- a housing in which to insert this card, placed behind his windscreen by the motorist, and comprising a
20 write circuit, alerted periodically under the control of a clock circuit, permitting the irreversible inscription, with time, of a position of the memory of the card introduced into the housing.

This system makes it possible to replace coins by
25 pre-paid microcircuit cards and ticket machines or other coin devices by individual housings available to users, which automatically debit the prepaid card by

the amount corresponding to the real time of parking, displaying the information required both by the user and by the surveillance personnel.

Although the system described in document [1] represents progress compared to money payment by means of parking meters or ticket machines, it has certain inconveniences for operators and for users. These inconveniences are clearly apparent depending on the respective aims:

10

Operator aims

To double the occupation level of parking places on the street: from 2.7 hours/day to 5.4 hours/day.

To improve the profitability of the carpark, in particular by reducing charges which represent 40% of the turnover.

To align fines with European norms: 250 francs (against 75 francs for a class 1 fine at present).

To produce 4.3 milliards of supplementary receipts by credibilising the parking system.

To credibilise the service rendered to the public:

- by facilitating payment,

- by informing motorists in real time of the geographic availability of parking places,

- by making traffic more fluid in town centres because of this user information,

- by improving the efficiency of controls,

- by improving the quality of anti-theft surveillance.

30

User needs

Proximity street parking (town centre, shopping streets).

Information about accessibility and geographical
5 availability of parking places.

High rotation of free parking places.

Simple, rapid, practical service.

Payment by onboard monetics systems.

Faced with the aims of the operators, the system
10 considered above cannot be the technical answer to the
essential need of dynamic management of the parking
they expect. It is a static system: the prepaid card is
debited depending on the internal clock time of the
housing, which is inscribed irreversibly on the card.
15 Since the clock frequency is pre-programmed when the
housing is manufactured, no modulation or modification
of parking prices by the service operators can be made
except by replacing the existing prepaid cards by new
ones, manufactured according to the new service
20 exploitation parameters. It gives no information about
the essential points mentioned above. This system even
tends to lower the information available to the
operators. There is no means of knowing whether a
parking place is occupied or free. In addition, this
25 system provides relatively low security for prepaid
cards: for municipal checking, these are only
identified by a series number, thus it is very easy to
clone cards in such a way as to defraud the system by
making a dummy debit system.

30 For users, this system has three major
inconveniences:

- the card remaining in the vehicle without surveillance represents a certain monetary value (300 francs per purchase): there is therefore a risk of break-in;

5 - the user must ensure that the credit available on the card is always sufficient;

- the distribution network is low, so that the journey to buy another card can sometimes be long.

Each town emitting its own prepaid card and only
10 recognising this one in its administrative zone, the user has to have several cards in order to be provided with the same service according to his geographic location.

Various data typical of the market for street
15 parking, given below, demonstrate the importance of such a market:

- ticket machines:

total number installed: 30,000 (on average 1 for 21 places),

20 price of each machine: 50,000 Francs before tax (total invested: 1.5 milliard francs before tax),

cost per parking place (purchase + installation + connection) : 2,800 Francs before tax,

depreciation over ten years:

25 - investment charges before tax:

per place and per year: 280 francs, thus a total of 200 mega-francs/year;

- running costs (maintenance, upkeep, collection) before tax:

30 per place and per year: from 500 francs to 1,300 francs, thus a total of 800 megafrancs per year;

- financial running costs: negligible.

A second prior art document, reference [2] at the end of the description, describes a teletolling system. For teletolling, the motorway companies have a radio-
5 frequency transmitter-receiver ("transponder" at 5.8 GHz). A "transponder" is remitted to the "teletoll" subscribers after they have taken out a local or national subscription with the motorway company/companies and a contract on the mode of payment
10 for services (prepaid teletolling, automatic debit). The personalised "transponder" (access codes and authentication) during the time of the subscription is placed by the user behind the windscreen of his vehicle and allows the latter automatic access, without
15 stopping the vehicle, to the teletoll service when passing the RF (radio-frequency) portals of the access booths.

The problems for such a transponder are essentially linked to the service on offer. Taking into
20 account the aims of the operators, the direction of the roads and the user needs, the opening of teletolling for a new clientele is inevitable. By its very concept, this system of prior art does not respond to new markets such as these.

25 The key factors of the present teletolling market are as follows:

- number of daily users: 100,000 or 1/3 of the total subscribers;
- average turnover per subscriber on teletoll
30 payments: 1,600 France (average teletoll consumption of 15 francs);

- price of the annual subscription: about 530 francs (deposit of the present state of the art card available to the user = 300 francs);

- average annual turnover from payments:
5 550,000,000 francs:

- turnover from subscriptions: 160,000,000 francs.

The present teletolling has the following advantages and disadvantages:

- it avoids queuing at the pay booths;
- 10 - it economises 30% on the cost of the journey.

On the other hand:

- there is no continuity over the whole of the motorway network;

- the annual subscription represents on average
15 33% of the price of actual consumption;

- such a service is expensive for occasional users, such as holidaymakers.

The needs of the teletolling service are the following:

- 20 - for the management and operators of the roads:
to increase the fluidity of motorway traffic,
reduction of clogging at toll booths,
continuity of traffic over the whole of the motorway network,
- 25 to have a single toll booth: universal inter-company teletolling,
to reduce the risks involved with money payments (thefts, fraud etc...) at the booths,
to reduce management costs (about 26%),
- 30 to increase the share of teletolling/money payment which now represents about 60% of transactions,

to reach one million of teletolling users in the year 2000;

- for the users:

to obtain a teletolling subscription price which
5 is more reasonable for occasional users (migrations during holiday periods),

to avoid waiting at toll booths,

to enable circulation of traffic over the whole network,

10 to have an easily accessible service (if possible from the vehicle to adapt to traffic conditions),

to have onboard monetics systems.

A third document referring to the present state of the art, reference [3] at the end of the description,
15 describes a process enabling remote payment transactions by using mobile terminals. In an application to payment for a parking, when the user vehicle arrives in a parking zone, a base station linked to a central computer transmits information for
20 loading the specifications linked to the parking zone and other information based on the different parking zones of the town concerned. This user can then activate the parking service from his mobile terminal, and communicate to the server in charge of the service
25 management the references of the parking zone where he intends to leave his vehicle, and then send a message to the base station to obtain the right to use a parking place. When, after a certain parking time, this user returns to recuperate his vehicle, he uses his
30 terminal to send a message that he is vacating his parking place to the central computer, via the base

station. His account, in a parking data base, is then debited by the sum corresponding to the length of time of parking.

Such a procedure does not use a specific terminal
5 in the vehicle. It requires a dialogue at the entry and exit of a parking zone with a base station. It does not provide a visual control of the correct payment of parking charges by the agents in charge of this verification who, therefore, have to pass enquiries
10 systematically to the central server concerning the conformity of rights of all the vehicles parked in the controlled zone.

A fourth prior art document, reference [4] at the end of the description, describes a procedure making it
15 possible to carry out financial transactions using mobile phones, in which a rechargeable multi-service payment card can be inserted. One of the services envisaged and mentioned as an indication only is that of payment for parking charges.

20 Such a procedure does not use a specific terminal either, to allow easy utilisation and simple verification of the correct payment of parking charges.

Compared with these solutions of prior art, the aim of the invention is to propose a new mobile system
25 of telepayment making it possible to offer users new payment possibilities, to simplify their specific daily requirements concerning parking in towns and payment without stopping the vehicle on motorway arteries, and which simplify the management of these services by the
30 operators, while making them more efficient.

server via an executable software which is downloaded simultaneously with the utilisation rights of the service or services requested and which, in the case of debited parking, in function of the charges in force in the zone where the vehicle stands, the time allowed bought by the user.

Advantageously, a prepaid card can be inserted in the portable terminal and this prepaid card can be debited by the latter through the intermediary of its programmable clock under the conditions imposed by the server when the service is activated by the executable software with which it is loaded.

The command means can be a cellular phone, a Publiphone (registered trademark) or a specific terminal which can be equipped with a card reader.

In a second embodiment, the portable terminal is a transponder integrating the command means. Advantageously the radio paging server is a cellular phone type server.

Advantageously the electronic card is a virtual card.

The communication network can be a radio network, a wire network or a cellular network.

Advantageously the command means, in a determined geographical zone, have access to a same local server linked to the central server. Advantageously said system comprises HF aerial beacons set respectively on the ticket machines and linked to a command unit, making it possible to send a periodic signal questioning the presence, in their respective control areas, of portable terminals installed in the parked

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vehicles, in order to manage the individual situation of each of them.

Thus the mobile system of telepayment by card remotely reloadable by radio paging applies to new
5 services dedicated to paying parking on the street and/or the passage of toll booths on motorways. In the first case it is used instead of ticket machines, and in the second case it is complementary to the teletolling of motorway companies.

10 These services are commanded by the user according to his needs by means of the command means. For example, concerning parking, the user adapts his parking time to his requirements: wherever he may be relative to his vehicle, he can command a credit of
15 units of allotted time (billing and payment of this credit being carried out by a smart network server dedicated to this service), this credit is teleloaded on the portable terminal (activated by the card) onboard the user's vehicle. The portable terminal takes
20 charge of displaying on its screen the electronic ticket relative to the parking rights of the user and the count-down for the time allotted.

For teletolling operation, the system according to the invention presents the following advantages:

25 - Concerning the motorway companies:

it puts the teletolling service within the possibilities of users of cellular phones and networks (mobile phone, radio paging) in particular, which represents an "unexpected" potential for this market
30 with:

six million mobile phone subscribers,

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two million radio paging subscribers;

it creates the technical and economic conditions needed to effectively reach the million teletolling users in 2000-2001:

5 by applying technological development:

monoservice card —> multiservice card,

by creating a low cost "pager" which is to be bought by the subscriber, with present predictions of prices: about 300 FF (price of the present card
10 deposit),

with a masked teletolling subscription cost,

with a service of national coverage;

it enables teletolling turnover to be doubled compared with the so-called "marginal" clientele:

15 by swinging the "motorway" budget towards this form of payment for the motorist who only uses the motorway network occasionally, during the holiday period,

with an annual average budget of 980 FF for the
20 "marginal" client (figures given by "Que Choisir" June 1998, for the 1997 annual budget of motorists);

it reduces the running costs of the motorway companies by changing from tollbooth payments to teletolling payment solutions;

25 it obtains a general improvement in the quality of service on the motorway (gaining time, reducing stress of the motorway personnel, who are thus more available at the booths etc.);

- concerning users:

30 it puts teletolling at the service of the public:

by facilitating the reduction of costs: a global subscription which is cheaper than the present single teletolling,

by being accessible at any hour in any place;

5 it opens teletolling to the "marginal" clientele of the general public:

with an occasional clientele which is only interested in teletolling for summer or winter departures, etc.

10 forming a potential reservoir to reach effectively the million subscribers expected;

it effectively reduces consumption costs:

through tariffs and bonuses.

15 Brief description of the drawings

- Figures 1 and 2 illustrate the operation of the system of the invention in a paying parking application;

20 - Figure 3 illustrates the system of the invention, such as that illustrated in figure 2, in an interactive telepayment application through a ticket machine;

- Figures 4 and 5 illustrate the operation of the system of the invention in a teletolling application;

25 - Figure 6 illustrates the transfers of information between the radio paging receiver, the electronic card, and an HF transponder, in a variant of the system of the invention;

30 - Figure 7 illustrates the portable terminal of the system of the invention such as that represented in Figure 6;

- Figure 8 illustrates the transfer of information between a local server and a central server in an application of the system of the invention to paying parking.

5

Description of embodiments

The present invention, as shown in figure 1, relates to a mobile system of telepayment by specific electronic card 12, of virtual type or not, remotely
10 reloadable by radio paging in the widest meaning of the term, that is to say by radio paging or cellular phone (POCSAG, GSM norms ...), comprising a radio paging server 24, a specific portable terminal 10 onboard a vehicle, which can be of the "Pager" type, that is to say a one-
15 way receiver of radio paging, or of the portable telephone type that is to say both a receiver and transmitter of radio paging, and a corresponding electronic card 12 which is inserted into this terminal 10 so as to activate it and give the user, owner of
20 said card, access to services dedicated to pay parking or teletolling. The portable terminal 10 without smart card 12 is an inert element. It is only activated once the card 12 is inserted since the latter contains all the dynamic elements for access rights to the service,
25 for example and among others the SIM user codes (Subscriber Identification Module). This system also comprises command means 20 available to this user, allowing downloading of utilisation rights of one of said services by the radio paging server 24 onto the
30 portable terminal 10.

In Figure 1 the operation of the system of the invention is shown in an application for payment of parking charges. Shown in this figure are the portable terminal 10 forming a housing comprising a receptacle 11 able to receive the specific card 12, a display screen 13, as well as several command keys 14. The command means 20 are linked by a communication network 21 to a local server 22 linked to a central server 23 itself linked to a radio paging server 24. This radio
10 paging server 24 makes it possible to send messages to the portable terminal 10. These command means 20 can be a cellular phone for example of the GSM type as represented in Figure 1, a "Publiphone" or any other specific terminal.

15 The communication network 21 can be, as here, a cellular network for example of the GSM, DECT... type, a wire network or a radio network.

 The links 25 between the radio paging server 24 and the portable server 10 are radio paging links in
20 the widest meaning of the term, that is to say radio paging links, for example to the POCSAG norm or cellular telephone links (GSM...).

 As shown in this figure, the user who has introduced his card 12 into the portable terminal 10
25 delivers an uploading command to the local server 22, from his cellular phone 20. This telephone 20 can advantageously be equipped with a card reader in order to enable payment from this telephone directly on line, through an electronic purse or by bank card.

30 In order to carry out this uploading there is a need for authentication of the user through his SIM

number, and perhaps by a confidential PIN code (Personal Identification Number).

For reasons of simplicity and efficiency the SIM code (identification module of the subscriber) of the
5 cellular phone of the user can be the same as that of the portable terminal 10 onboard the vehicle.

The specifications of the command are sent to the radio paging server 24. The radio paging server then initialises the loading of the desired utilisation
10 rights. The messages emitted then are coded, authenticated (with an authenticator internal to the server: for example an algorithm), and signed, with reference to the specifications of the command (amount, date). With a signature corresponding to a dated
15 transfer, refusal of the command can thus be avoided.

In the application to paying parking the uploading command consists of a demand for parking time. The loading is then a transfer of parking time and message authentication by radio paging. The display screen 13
20 of the portable terminal can then show the end of parking time authorised as well as the date.

When the command means are a "Publiphone" or a cellular phone, the local server can ask the bank card used to send back the certificate emitted with
25 signature.

An example of operational mode of the parking service will be considered below. There is a succession of stages as follows:

(a) Parking server request of a town from the
30 user, who will already have inserted in his telephone, for example of the GSM type, his blue card or his

electronic purse. The terminal aboard the vehicle is then activated.

(b) This request is carried out on the desired parking place of the vehicle. The aerials of the GSM
5 network then localise the request place geographically. The server receives this information and attributes it to a tariff zone already established.

(c) Either by display or by vocal paging the server invites the user to choose a length of parking
10 time, eventually with a maximum time limit linked to the parking zone concerned.

(d) The user makes his choice and communicates it to the server.

(e) If the user uses an electronic purse, the
15 server goes directly to take the amount related to the service requested by the user. If the user uses a blue card, the server makes a connection with the GIE of bank cards and carries out a secure banking transaction in which the user must enter his confidential banking
20 PIN code on the keyboard of his mobile GSM.

(f) If the transaction is accepted, the parking server validates it and sends in return a message, which is the authorisation certificate for parking corresponding to the service requested. This message is
25 displayed both on the terminal onboard the vehicle, visible from outside through the windscreen, and on the screen of the GSM mobile phone in which it can be registered as proof of the transaction. The message displayed by the onboard terminal in the vehicle
30 comprises all the information needed for verifying correct payment. Moreover, to avoid fraud, the complete

message sent by the server contains, for example, a numbered certificate which is not displayed but is stored in a memory of the onboard terminal designed for this purpose.

5 (g) The user who has under-estimated his parking time can thus prolong it without returning to his vehicle. In this case the user who has already carried out the preceding phases (a-f) calls back the server, which gives him the service option of prolonging his
10 parking time. When the user confirms the choice of this option, the server which has kept in memory the localisation of the parking place of the vehicle indicates to the user only the length of time available taking into account the time already used up and the
15 limit imposed by the parking zone. From this point, the user and the server carry out steps d and f already described. When all is validated, the parking certificate is sent and received simultaneously in two different places: on the place where the user and his
20 cellular phone are located and on the place where the vehicle is parked.

In figure 2, two users wishing to use a pay parking for their respective vehicles 30 and 30' in geographic zones 31, 31' depending on two separate
25 local servers 22 and 22' use respectively their cellular phone, not shown here, to request downloading of parking units into their respective onboard terminals 10, not shown here. Apart from the central server 23 and the radio paging server 24, already shown
30 in figure 1, the GSM aerials 32, 33 and 32', 33' are

also shown as well as a radio paging transmitter aerial
34.

In the central server the following operations are
carried out:

- 5 - service access;
- user authentication;
- client billing and break-down per geographic
zone (for example by town);
- downloading command for parking units to the
10 radio paging server or servers.

In different variants of the embodiment the
onboard terminal 10 can contain supplementary features,
for example:

An internal clock programmable by the parking
15 server via an executable inserted into the parking
authorisation message: this enables real time billing
for the user.

A system of prepaid card and internal clock
programmable by the parking server: in this case the
20 user slides the prepaid card into the system aboard the
vehicle and calls the server by his cellular phone to
activate the service. When the vehicle has been
localised, the server applies the tariff of the zone
concerned and sends the onboard terminal the executable
25 for programming the clock of said onboard system to
debit this prepaid card under the conditions requested,
as well as the authentication certificates allowing the
agents in charge of verifying the parking rights to
ensure the legality of the onboard system and its
30 prepaid card during a control.

A system for a prepaid card, a virtual card, or an electronic purse piloted directly by a ticket machine of the parking zone equipped with specific means: in this case the onboard system of the vehicle is two-way,
5 it receives and transmits data at short distance (~ 100 to 200 metres) with a ticket machine also provided with specific means to manage autonomously and in real time the parking of a vehicle placed in its zone of action.

Figure 3 shows such a variant of an embodiment of
10 the system according to the invention in an application by interactive telepayment through a ticket machine. Two HF aerial beacons 35 and 36 set respectively on the two ticket machines, and linked to a command unit 37 make it possible to send a periodic signal questioning
15 the portable terminals onboard the two vehicles 38 and 39.

Thus, one can have the following message exchanges between the HF aerial and the portable terminals:

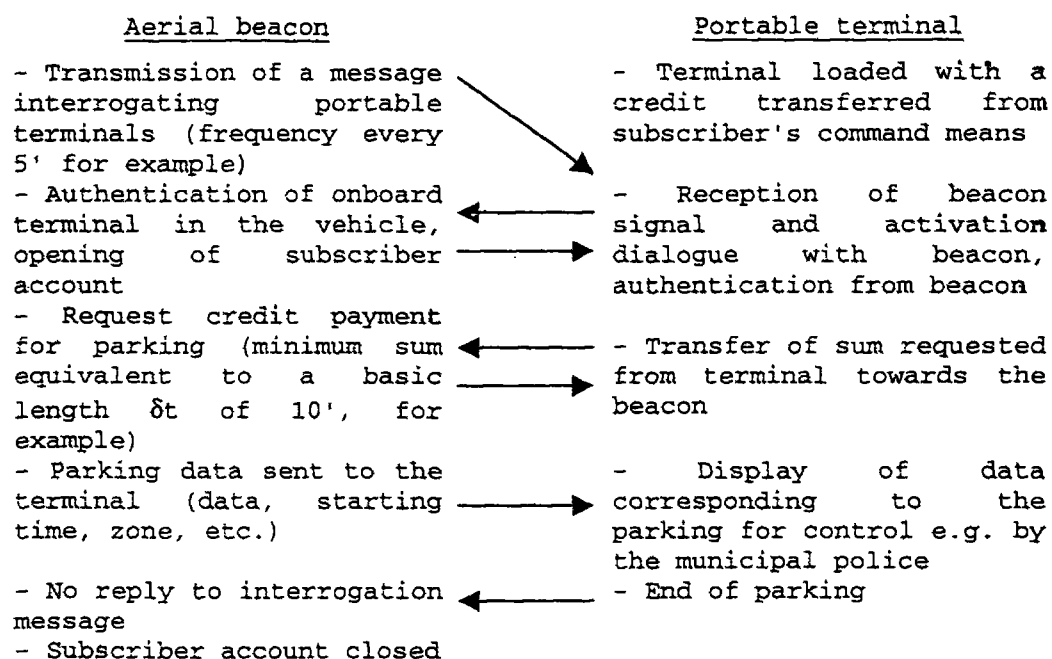


Figure 4 shows the operation of the system according to the invention in a teletolling application. The references used in figures 1 and 2 to distinguish the different elements of the system of the invention have been kept in this figure. Thus the command means 20, here a cellular phone, are linked to aerials 32 through a liaison 21. These aerials are linked to a central server 23 itself linked to a radio paging server 24 which itself sends a remote data command 25 to the portable terminal 10 associated with the card 12, via a transmitter 34.

In this type of operation the use of a local server is no longer necessary.

The user makes a purchase of teletolling credit from terminal 20 to the central server 23 by the intermediary of aerials 32. This central server 23 carries out an authentication, a billing and a command

for radio paging service from the radio paging server 24 which then, by radio paging, transfers towards the radio paging receiver 10 a teletolling credit and a downloading on the card 12, via the transmitter aerial 34 or, according to another embodiment of the operation, a transfer towards this same radio paging receiver 10 of personal access codes to the service or services allowing payment by the user of the toll charges which have to be paid by the subscriber.

10 In figure 5 a first and a second vehicle are shown respectively in a first position 40 and 41 and in a second position 40' and 41' passing the entry or exit teletolling portal 42 or 43 of a motorway.

Each of these portals 42 or 43 makes it possible 15 to carry out a debit-credit, by data transmission 44 or 45 to the user card situated in the corresponding vehicle, by transferring data to a server 46 belonging to the motorway companies linked itself to a server 47 of the operating company.

20 Each portal 42 or 43 commands the opening or not of a barrier 48 or 49 for entry or exit from the motorway, associated with a light signal 50 or 51.

Each portal 42 or 43 makes it possible to capture the onboard radio paging CCP receiver number and/or 25 reading of the card introduced into it. This makes it possible to:

- accept or refuse access, by operating or not the access barrier 48 or 49;
- command destruction of a stolen card;
- 30 - command writing of the entry point on the motorway.

The server 46 of the motorway companies carries out the following operations:

- capture of the card identification number (CCP) and/or;

- 5 - identification of the HF transponder;
- control of the access subscription rights;
- identification of the entry/exit portals;
- billing of the pay charges with credit update of the HF transponder.

10 The server 47 of the operating company carries out the following operations:

- consultation of the subscriber register: CCP code, access rights;
- situation updates.

15 The server 47 makes it possible to determine the services to which the user has subscribed: parking, tolls..., or to know whether he is denied access (cases of non-payment for example), in which event his card can be destroyed.

20 In this teletolling application, the onboard portable terminal 10, in which a user smart card 12 is introduced for validation, is associated with a radiofrequency (RF) teletolling transponder 55, as shown in figure 6. The same occurs in the case of
25 interactive telepayment by ticket machine, as shown in figure 3.

 Illustrated in figure 6:

- reception and treatment of motorway or parking radio paging 56;

- 30 - downloading 57 of certificates of time units used and the coded card number;

- display 58 of time units and signature of messages displayed;

- transmission 59 of the authentication code (CCP) of the smart card;

5 - data exchange 60 with the motorway portals (5.8 GHz) or parking aerial beacons, with updating of the debit/credit account;

- debit toll 61, certificate;

10 - possibility of connection 62 to an electronic control of the vehicle to allow, if needed, after exchanging control codes, immobilisation of the vehicle by acting on a vital element if it has, for example, been stolen.

15 The reference element 63 on the onboard terminal 10, as an example, is an infrared or radiofrequency receiver allowing the police authorities to display on screen 13 the authentication data which certify the validity of the messages displayed.

20 Figure 7 illustrates the ensemble of the portable terminal + HF transponder card as represented in figure 6. Thus, one has:

- the HF transponder (or badge) 65 with an HF entry/exit 66 (5.8 GHz), which comprises:

- a duplexer 67,

25 a low noise amplifier 68

- a first component treating the signal 69,

- an analogue/digital converter 70,

- a second component treating the signal 71,

- a power amplifier 72;

30 - the portable terminal comprising:

- a control circuit 75 comprising:

an HF decoder 76,
an RF decoder 77,
a treatment circuit 78 comprising a processor 79,
a random access memory 80, and a read only memory 81;
5 an RF receiver 82 with an RF access (929-932, 934-
941 MHz) 83:
a low noise amplifier 84,
a signal treatment component 85,
an analogue/digital converter 86;
10 a user interface 90 comprising:
a display screen 91,
an interface unit 92;
a card reader 93 comprising:
an actual card reader 94 in which the smart card
15 96 can be introduced,
an interface unit 95.

The ensemble of these circuits is well known to those skilled in the art, as described in documents [5] and [6].

20 In a variant of the embodiment, one can also use the system according to the invention for creating an onboard electronic purse. In this case a keyboard is associated to the portable terminal of the invention. Thus one can have a succession of the following
25 operations:
- introduction of the card into the card reader;
- type on the keyboard to request a transfer of funds operation, and to type the card PIN code;
- if the typed code is correct, type the sum
30 required;
- validation.

Thus the said sum is transferred from the card to the terminal.

The reverse succession of these operations can also take place:

- 5 - type the PIN code of the card;
- if the typed code is correct, transfer of the sum remaining from the terminal to the card.

A function like this makes it possible not to block a card for a single operation, but to be able to
10 use it for several operations.

Figure 8 shows the system of the invention in dynamic operation in an application to paying parking.

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REFERENCES

- [1] FR-A-2 615 304
- [2] "Projet TIS Phase 2 " (15/7/1996, Cegelac-CGA, "Document de spécification et conception du système")
- 20 [3] WO 97/45814
- [4] EP-A-O 785 534
- [5] "Selector Guide for Basic FLEX™ Pager" (e-mail Motorola, 15/10/1997)
- [6] "The Role of Digital Signal Processors in Pager
25 Technology", Xiao-An Wang and Dwane Bell (pages 36, 38, 42 and 44, "RF Tutorial", December 1996).

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CLAIMS

1. A mobile system of telepayment of access rights to services for use by motorists, renewable remotely by radio paging, used for services dedicated to paying parking and/or teletolling, comprising means of transmission and a specific portable terminal (10) comprising a display screen (13), onboard a vehicle, and characterised in that it also comprises an electronic card (12) at the disposal of a user, able to be inserted into said terminal so as to activate it and to give this user, upon reception of a signal from means of transmission, access to at least one of said services, command means (20), at the disposal of this user, having access to a server (23) linked to the means of transmission, these command means (20) allowing this user to request downloading (25) of utilisation rights of the service or services onto the portable terminal (10) and to display them on the latter's display screen (13), against payment made by the command means.

20

2. A system according to Claim 1, in which the portable terminal (10) is a radio paging receiver.

3. A system according to Claim 2, in which the portable terminal (10) is equipped with an internal clock programmable by the server (23) via an executable software which is downloaded to it (25), simultaneously with utilisation rights of the service or services demanded and which, in the case of parking, debits



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according to the tariffs in force in the zone where the vehicle is parked, the allotted time bought by the user.

5 4. A system according to either one of Claims 2 or
3, in which a prepaid card is inserted in the portable
terminal (10), and in which this prepaid card is
debited by the latter through the intermediary of its
programmable clock under the conditions imposed by the
10 server (23) when the service is activated by the
executable software with which it is loaded (25).

5. A system according to Claim 1, in which the
command means (20) are a cellular phone, a PubliPhone
15 (registered trademark) or a specific terminal.

6. A system according to Claim 5, in which the
cellular phone is equipped with a card reader.

20 7. A system according to Claim 1, in which the
portable terminal (10) is a transponder which
integrates the command means (20).

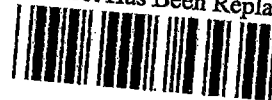
8. A system according to Claim 7, in which the
25 radio paging server (24) is a cellular phone server.

9. A system according to Claim 1, in which the
electronic card (12) is a virtual card.



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10. A system according to Claim 1, in which the communication network (21) is a radio network, a wire network or a cellular network.

5 11. A system according to Claim 1, in which the user rights are a credit of units for allotted time.

12. A system according to Claim 1, in which the command means (20), in a determined geographic zone
10 (31, 31'), have access to a same local server (22, 22') linked to a central server (23).

13. A system according to Claim 1, comprising HF
aerial beacons (35, 36), linked to a command unit (37),
15 making it possible to send a periodic signal of interrogation of presence, in their respective control areas, to onboard portable terminals in the parked vehicles, in order to manage the individual situation of each of them.

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ABSTRACT OF THE DISCLOSURE

MOBILE SYSTEM OF TELEPAYMENT OF ACCESS RIGHTS
TO SERVICES FOR USE BY MOTORISTS,
RENEWABLE REMOTELY BY RADIO PAGING

The present invention concerns a mobile system of telepayment of access rights to services for use by motorists, renewable remotely by radio paging, used for services dedicated to paying parking and/or
5 teletolling, comprising means of transmission, a specific portable terminal (10) comprising a display screen (13) installed in a vehicle, an electronic card (12) at the disposal of a user, able to be inserted into said terminal so as to activate it and to give
10 this user, upon reception of a signal from means of transmission, access to at least one of said services, command means (20) at the disposal of this user, having access to a server (23) linked to the means of transmission, these command means (20) allowing this
15 user to request downloading (25) of utilisation rights of the service or services onto the portable terminal (10) and to display them on the latter's display screen, against payment made by the command means.

20 Figure 1

FIG. 1

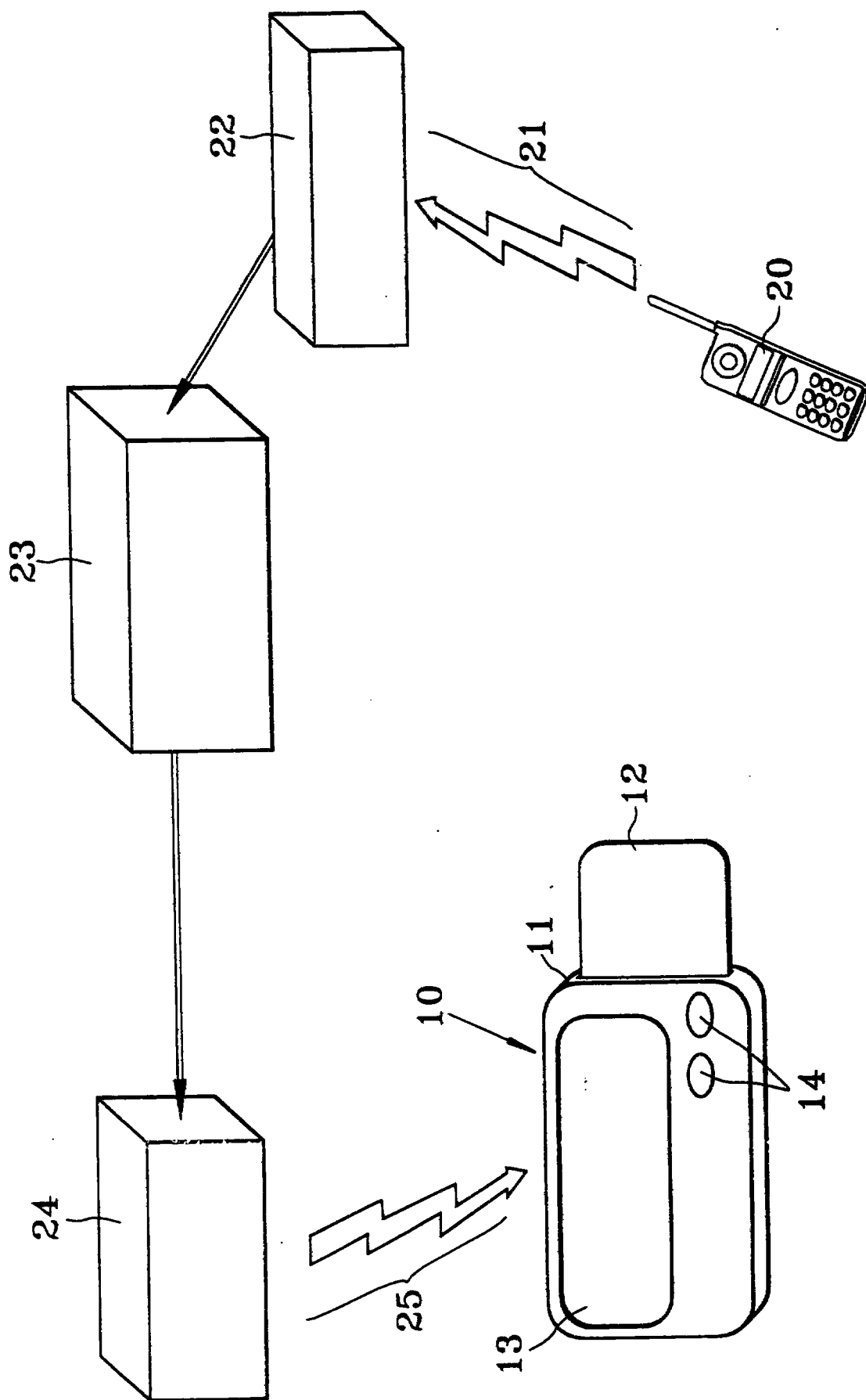


FIG. 2

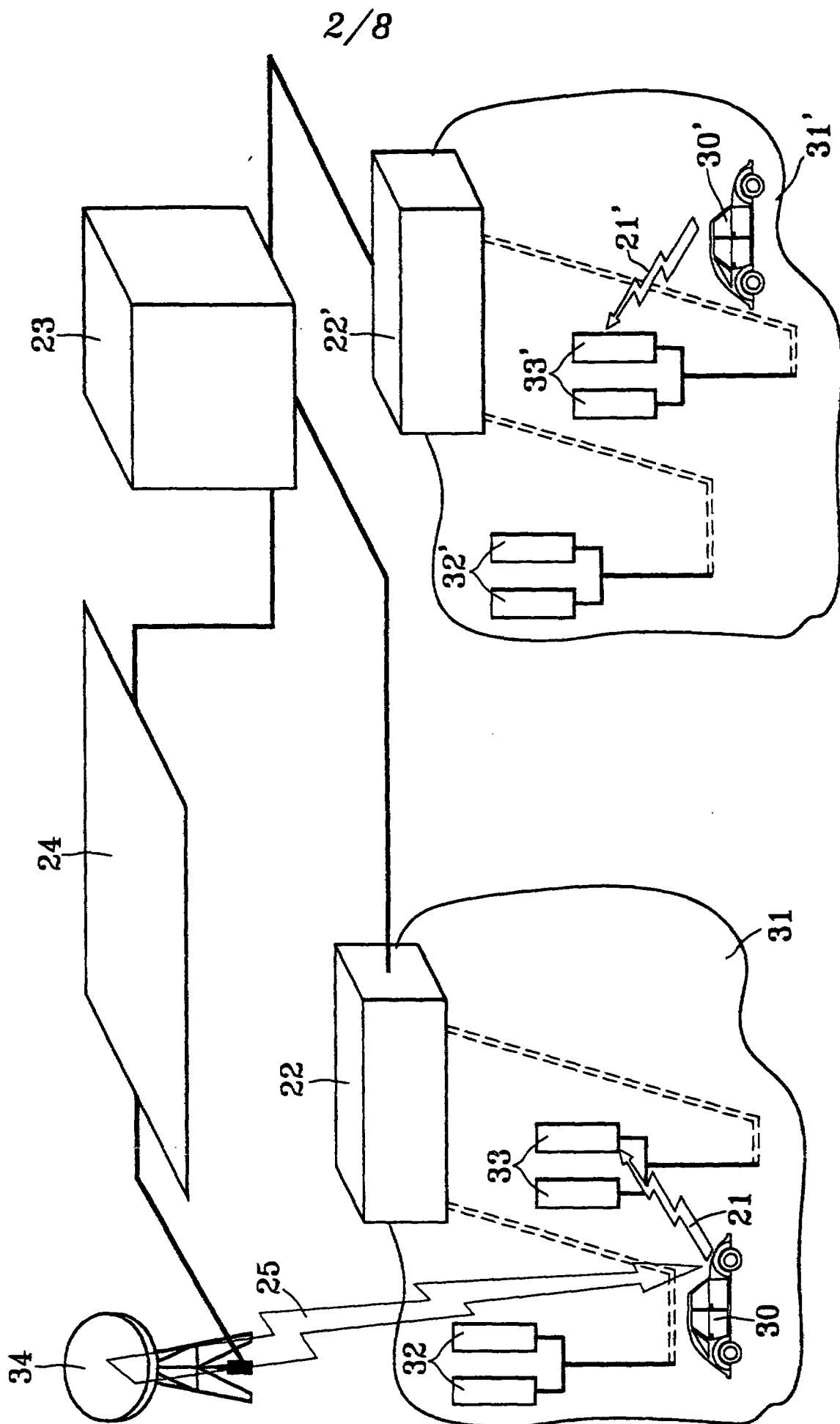


FIG. 3

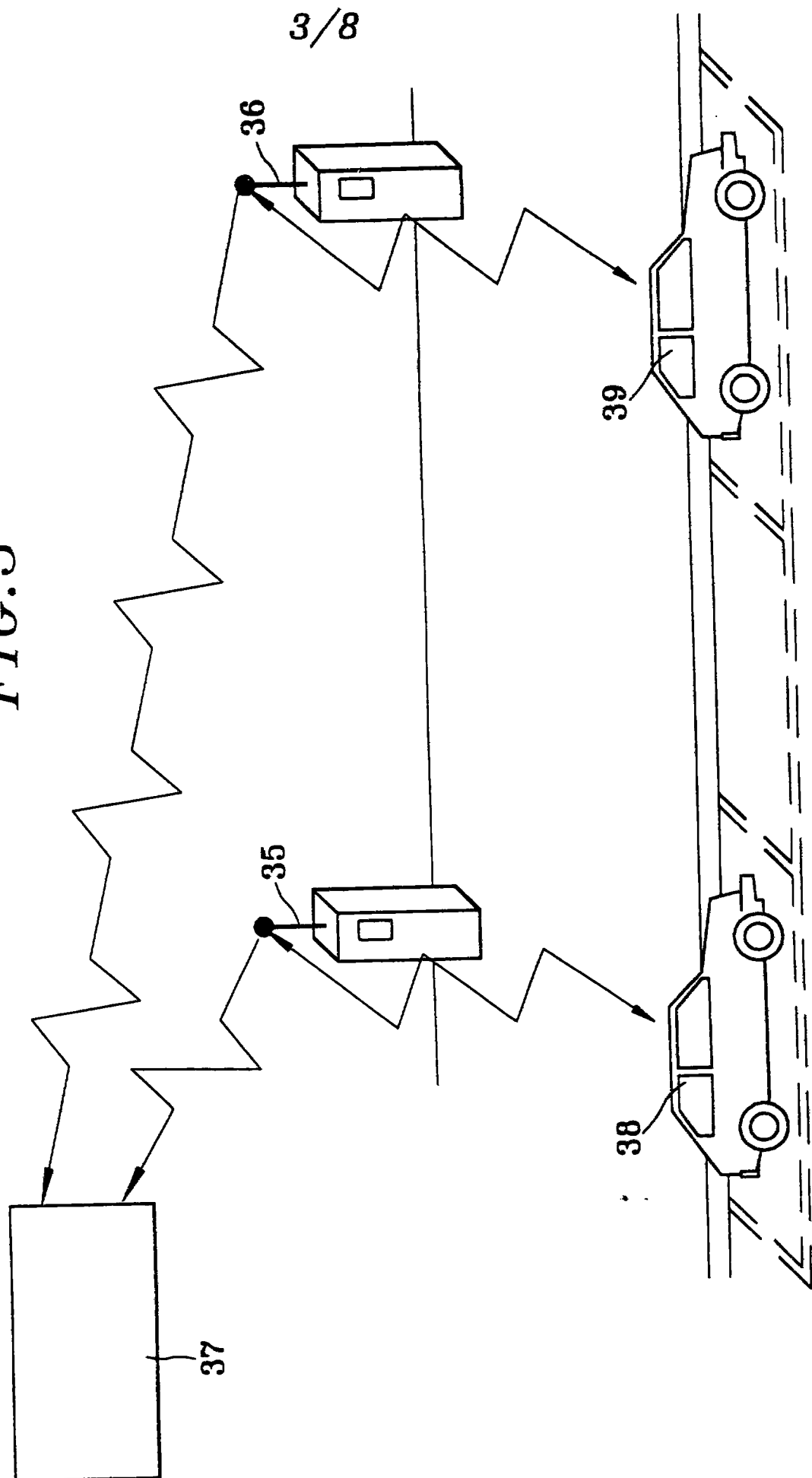


FIG. 4

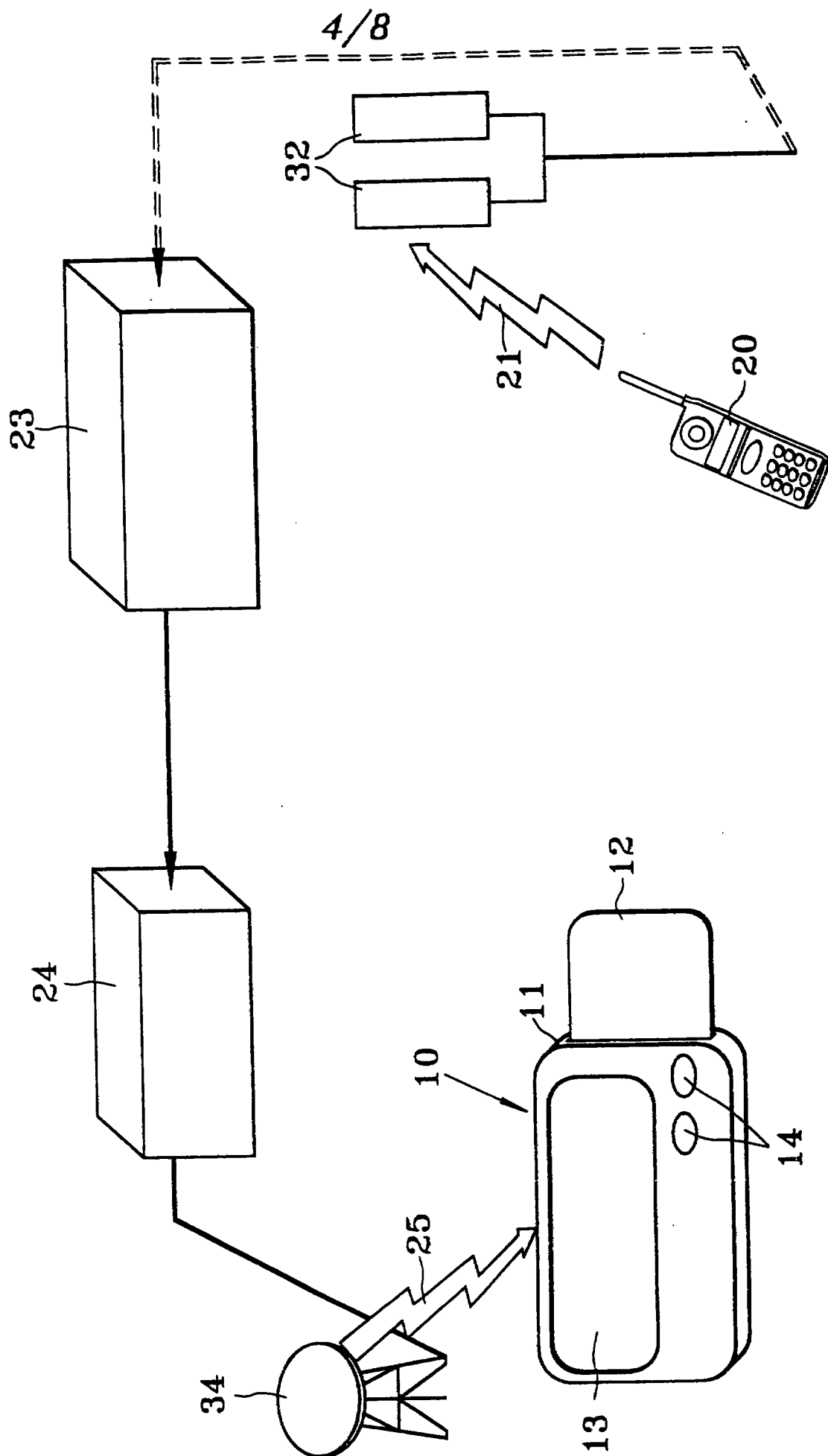


FIG. 5

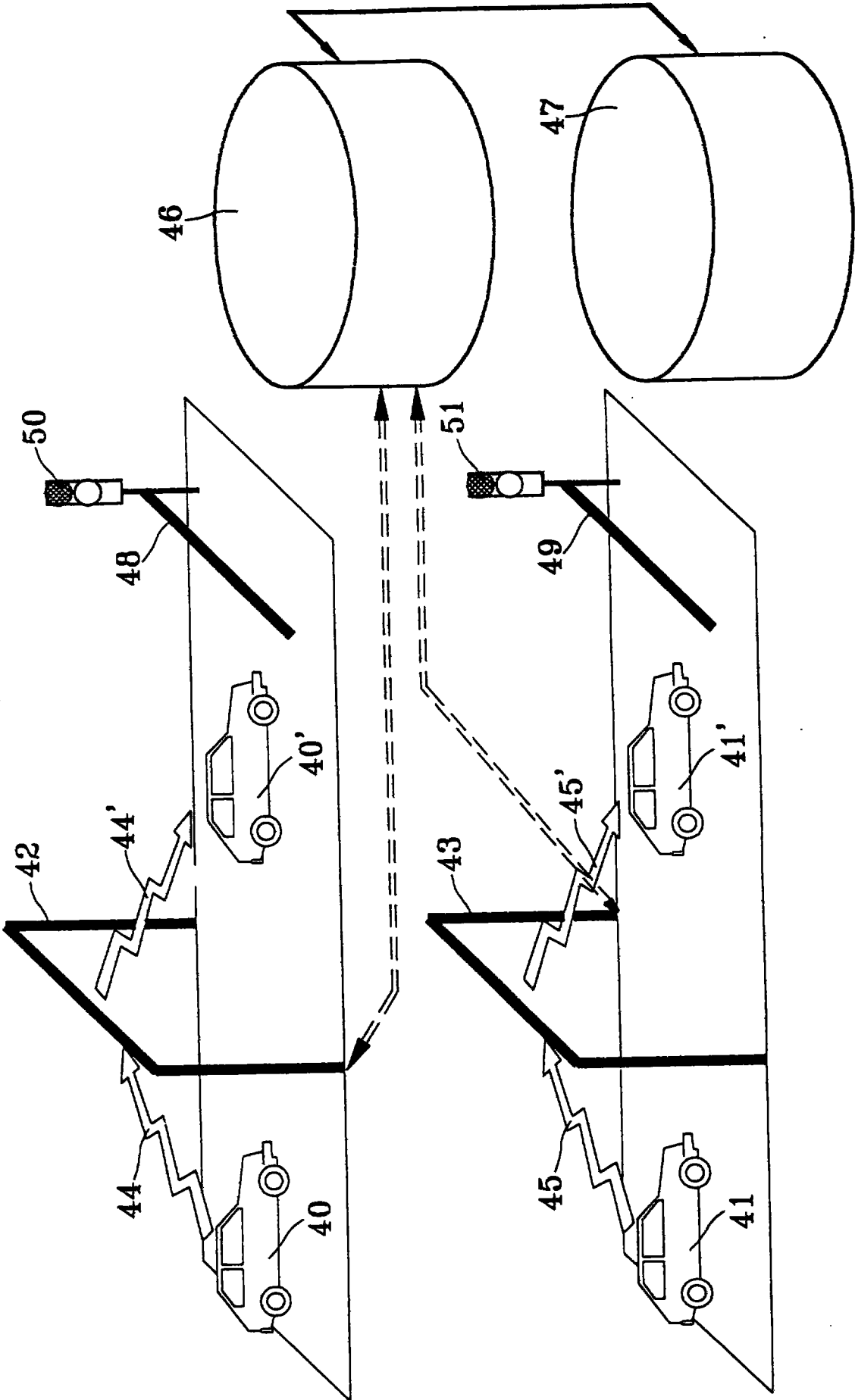


FIG. 6

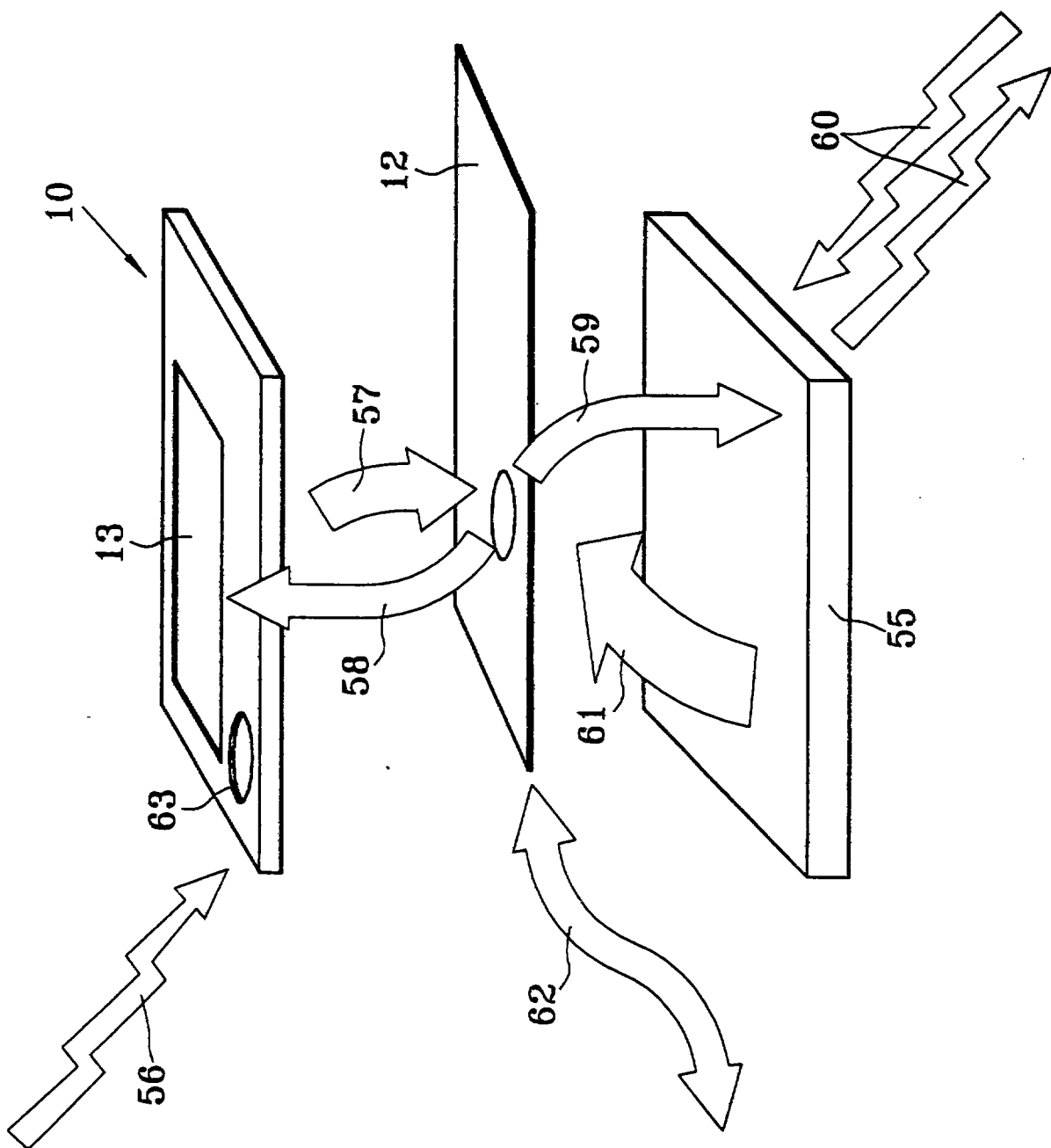


FIG. 7

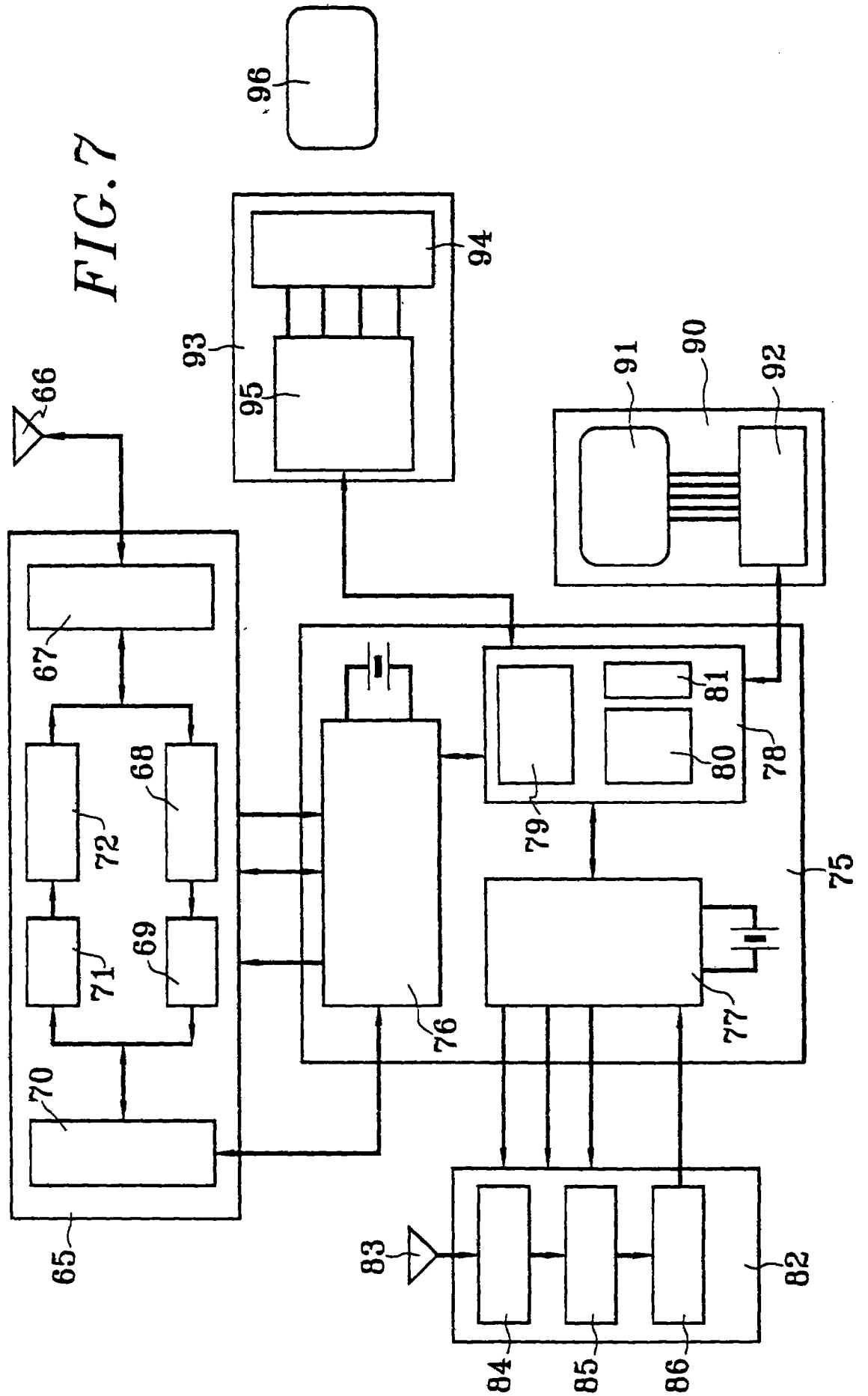
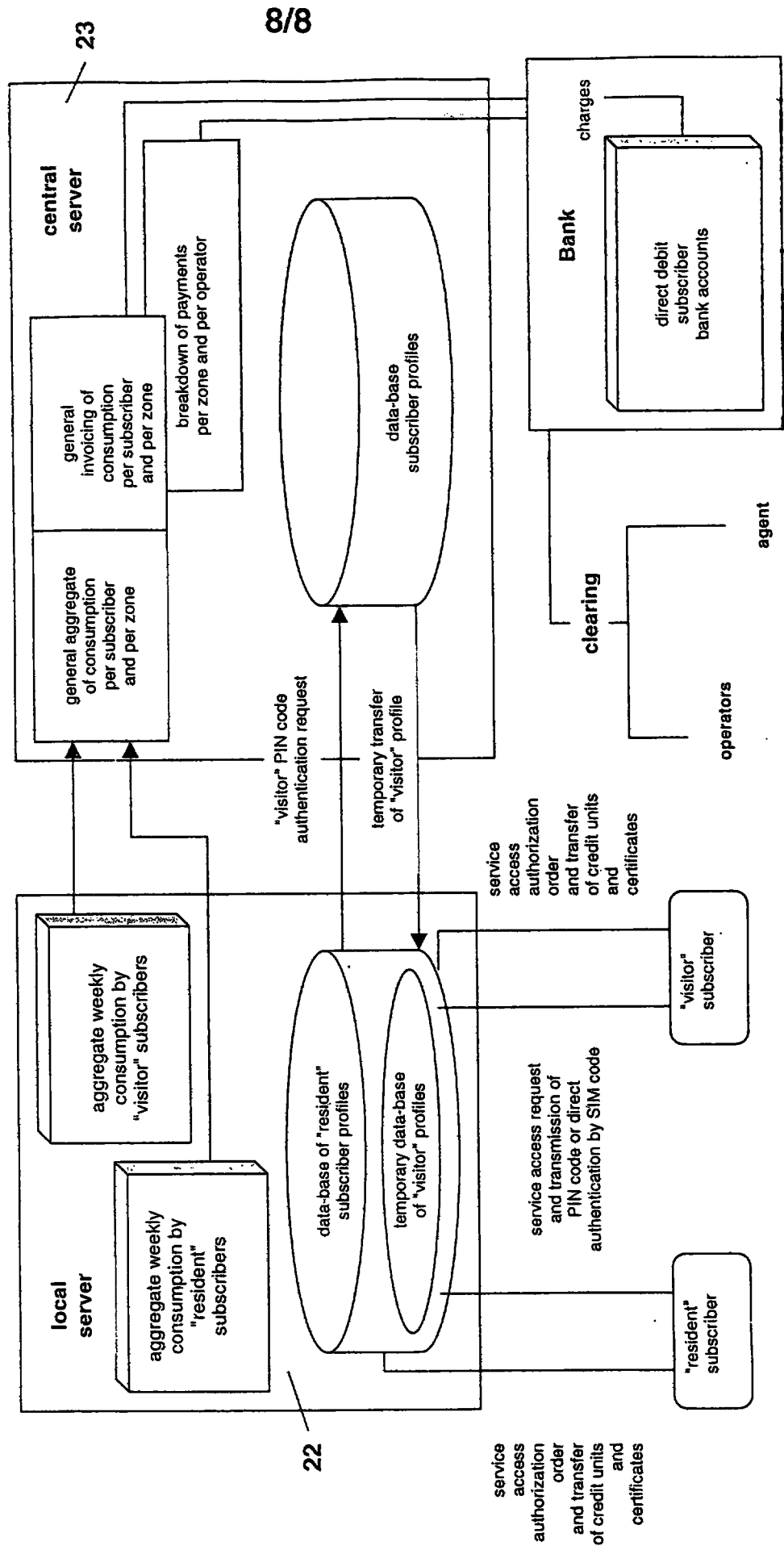


FIG. 8



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Description of the invention

The present invention relates to a mobile system of telepayment of access rights to at least one service intended for use by motorists, for example a service dedicated to paying parking and/or teletolling, renewable remotely by radio paging, comprising transmission means and a first portable terminal comprising a display screen onboard a vehicle and characterised in that it also comprises an electronic card at the disposal of a user, able to be inserted into said first terminal so as to activate it and to give this user, upon reception of a signal from the means of transmission, access to this service, a second portable terminal, at the disposal of this user, having access to a server linked to the means of transmission, this second portable terminal allowing this user to request downloading of utilisation rights of this service or services onto the first portable terminal and to display them on the latter's display screen, against payment made by the second portable terminal.

Contrary to the documents, referenced [3] and [4], analysed above, the invention concerns a system using a specific first portable terminal onboard which allows visual control of correct payment of parking charges or telepayment by the agents in charge of this verification. In addition, there is no transfer of money towards this onboard terminal, but utilisation rights. Thus this terminal never contains money.

In a first embodiment of the invention the first portable terminal is a radio paging receiver.

Advantageously the first portable terminal can be equipped with an internal clock programmable by the

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server via an executable software which is downloaded simultaneously with the utilisation rights of the service or services requested and which, in the case of parking debits, in function of the charges in force in
5 the zone where the vehicle stands, the time allotted bought by the user.

Advantageously, a prepaid card can be inserted in the first portable terminal and this prepaid card can be debited by the latter through the intermediary of
10 its programmable clock under the conditions imposed by the server when the service is activated by the executable software with which it is loaded.

The second portable terminal can be a cellular phone, a Publiphone (registered trademark) or a
15 specific terminal which can be equipped with a card reader.

In a second embodiment of the invention, the first portable terminal is a transponder integrating the second portable terminal. Advantageously the radio paging server is a
20 cellular phone server.

Advantageously the electronic card is a virtual card.

The communication network can be a radio network, a wire network or a cellular network.

Advantageously the second portable terminal, in a determined geographic zone, has access to a same local server linked to the central server. Advantageously
25 said system comprises HF aerial beacons set respectively on the ticket machines and linked to a command unit, making it possible to send a periodic signal questioning the presence, in their respective control areas, of the first portable terminals onboard the parked

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vehicles, in order to manage the individual situation of each of them.

Thus the mobile system of telepayment by card remotely reloadable by radio paging applies to new
5 services dedicated to paying parking on the street and/or the passage of toll booths on motorways. In the first case it is used instead of ticket machines, and in the second case it is complementary to the teletolling of motorway companies.

10 These services are commanded by the user according to his needs by means of the command means. For example, concerning parking, the user adapts his parking time to his requirements: wherever he may be relative to his vehicle, he can command a credit of
15 units of allotted time (billing and payment of this credit being carried out by a smart network server dedicated to this service), this credit is teleloaded on the portable terminal (activated by the card) onboard the user's vehicle. The portable terminal takes
20 charge of displaying on its screen the electronic ticket relative to the parking rights of the user and the count-down for the time allotted.

For teletolling operation, the system according to the invention presents the following advantages:

25 - Concerning the motorway companies:

it puts the teletolling service within the possibilities of users of cellular phones and networks (mobile phone, radio paging) in particular, which represents an "unexpected" potential for this market with:

six million mobile phone subscribers,

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CLAIMS

1. A mobile system of telepayment of access rights to at least one service intended for use by motorists, which is a service dedicated to paying parking and/or teletolling, renewable remotely by radio paging, comprising means of transmission and a first portable terminal (10) comprising a display screen (13), onboard a vehicle, and characterised in that it also comprises an electronic card (12) at the disposal of a user, able to be inserted into said first terminal so as to activate it and to give this user, upon reception of a signal from means of transmission, access to this service, a second portable terminal (20), at the disposal of this user, having access to a server (23) linked to the means of transmission, this second portable terminal (20) allowing this user to request downloading (25) of utilisation rights of the service or services onto the first portable terminal (10) and to display them on the latter's display screen (13), against payment made by the second portable terminal (20).

2. A system according to Claim 1, in which the first portable terminal (10) is a radio paging receiver.

5

3. A system according to Claim 2, in which the first portable terminal (10) is equipped with an internal clock programmable by the server (23) via an executable software which is downloaded to it (25),



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simultaneously with utilisation rights of the service
or services demanded and which, in the case of paying
parking, debits according to the tariffs in force in
the zone where the vehicle is parked, the allotted time
5 bought by the user.

4. A system according to either one of Claims 2 or
3, in which a prepaid card is inserted in the first
portable terminal (10), and in which this prepaid card
10 is debited by the latter through the intermediary of
its programmable clock under the conditions imposed by
the server (23) when the service is activated by the
executable software with which it is loaded (25).

15 5. A system according to Claim 1, in which the
second portable terminal (20) is a cellular phone, a
Publiphone (registered trademark) or a specific
terminal.

20 6. A system according to Claim 5, in which the
cellular phone is equipped with a card reader.

7. A system according to Claim 1, in which the
server (23) is linked to a radio paging server (24)
25 which is a cellular phone server.

8. A system according to Claim 1, in which the
electronic card (12) is a virtual card.



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9. A system according to Claim 1, in which the communication network (21) is a radio network, a wire network or a cellular network.

5 10. A system according to Claim 1, in which the utilisation rights are a credit of units for allotted time.

10 11. A system according to Claim 1, in which the second portable terminal (20), in a determined geographic zone (31, 31'), has access to a same local server (22, 22') linked to the central server (23).

15 12. A system according to Claim 1, comprising HF aerial beacons (35, 36), linked to a command unit (37), making it possible to send a periodic signal of interrogation of presence, in their respective control areas, of the first portable terminals (10) onboard the parked vehicles, in order to manage the individual
20 situation of each of them.

13. A mobile system for access to an onboard electronic purse service intended for motorist users making it possible to transfer funds remotely by radio
25 paging, comprising means of transmission and a portable transponder terminal (10) comprising a display screen (13) and a keyboard installed in a vehicle, characterised in that it also comprises an electronic card (12) at the disposal of the user, able to be
30 inserted in said terminal in such a way as to activate it and to give this user, upon reception of a signal



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from the means of emission, access to this service,
command means (20) integrated in this terminal (10), at
the disposal of this user, having access to a server
(23) linked to the means of emission, these command
5 means (20) making it possible for this user to request
transfer of a given sum from the card (12) to the
portable terminal (10) or from the portable terminal
(10) to the card (12).

