SYSTEM FOR ELECTRONIC COMMERCE TRANSACTIONS, PORTABLE ELECTRONIC COMMUNICATIONS DEVICE, COMMUNICATIONS NETWORK, COMPUTER PROGRAM PRODUCT AND METHOD THEREOF

TECHNICAL FIELD OF THE INVENTION

The invention relates generally to the field of electronic data transfer through a network including a plurality of devices for data storage and communication, such as mobile communication terminals. The invention is particularly applicable to a system and network for electronic data transfer related to electronic commerce transactions.

BACKGROUND OF THE INVENTION

There are various known network architectures for communication between units of memorization, in which the data transfer between said units of memorization follow predetermined rules for access control and synchronization. A number of networks of such type involving a plurality of smart cards cooperating with a plurality of transfer devices have been developed since the creation of the smart card.

The increasing complex environment of application, as well as the concurrent development of other types of portable objects, such as mobile communication terminals (and particularly mobile phones), presents new problems requiring innovative resolutions.

For example, in systems and applications of e-commerce known in the prior art, an user uses a credit or smart card for paying a certain product or service at a determined point of sale (POS). In case of smart card payment schemes, in which a certain amount of money is stored in electronic form in a smart card, each time the user purchases a product or service, a read/write terminal located at the POS reads the user and/or smart card information and subtracts the cost of such product or service.

Smart cards or integrated circuit (IC) cards comprise generally a semiconductor memory in which an amount of electronic money can be stored, read or written and means for

contact or contact-less communication with the corresponding POS read/write terminal. In the latter case, the smart card shall be simply held near the POS read/write terminal or tapped over a reading surface. Such applications in which a user purchases goods, commodities or services with the aid of an IC card that stores electronic money data are known as electronic purse (E-purse) applications. When the electronic money balance of the IC card reaches zero or is insufficient to buy a certain product, the card can be refilled by using a specific refill terminal that transfers electronic money to the smart card. Said refill terminal either receives cash from the user or subtracts the amount of money transferred to the card from the user's bank account or from an electronic money account (E-wallet) opened by the user with a certain broker, which may be the company that provides the E-purse card to the user.

In order to be able to check the actual balance of the E-purse, the user has to go to the closest POS and/or refill terminal, which will read the current electronic money stored in the IC card and will display it to the user. To avoid user displacements to the closest POS terminal and to provide means for checking the actual balance of the E-purse at any time and any place, some small IC card readers can be purchased or, recently, it is known that some mobile phones are provided with such IC cards and the card balance can be read at the mobile phone display.

However, current state of the art techniques still present the disadvantage that a user cannot refill his E-purse without having to go to a refill terminal, which sometimes is only possible during operating hours at designated POS. Therefore, when the electronic balance stored in the IC card is not enough to buy a certain product or service, the user will not be able to accomplish the desired purchase at any time. He will have to locate an electronic money refill terminal, move to that location and wait until such terminal is free for use.

DISCLOSURE OF THE INVENTION

The present invention aims to overcome the drawbacks of the prior art. In particular, an objective of the present invention is to provide a system for electronic data transfer through a network comprising a plurality of data storage and communication devices, such as mobile communication terminals, in which the user is able to request, in an extended, coordinated and protected manner, a transaction between various memory units to which he has selective access, from a single command point (his mobile communications terminal). Another objective of the invention is to provide such a system, as well as the associated devices and methods, which are particularly suited for the management of a network of electronic wallets and electronic purses.

According to the invention, these objectives as well as others which will become apparent later, are achieved with the aid of a system for electronic data transfer between a first plurality of communications equipment and a second plurality of communications equipment connected with each other by a communications network,

the first plurality of communications equipment being portable electronic devices each carried by a user and each said portable electronic devices comprising first data transfer control means connected to first memory means and wireless communication means, the wireless communication means being adapted to communicate wirelessly through the communications network with the second plurality of communications equipment,

the second plurality of communications equipment being located each at fixed locations of a communications network and comprising second data transfer control means connected to second memory means,

the data transfer control means of the first plurality of communications equipment being adapted to generate and send first and second type messages, via the wireless communication means, to the second plurality of communications equipment, said first type messages comprising a request to modify a value stored in the first memory means or second memory means and user identification information and said second type

messages comprising an indication that a value stored in the first memory means has been modified,

the data transfer control means of the second plurality of communications equipment being adapted to receive and analyze first and second type messages coming from the first plurality of communications equipment, to check if the user identity permits to access the second memory means and to generate and send third type messages, via wireless communication means, to the first plurality of communications equipment, said third type messages comprising an indication to modify the value stored in the first memory means or an electronic data transfer error indication,

the data transfer control means of the first plurality of communication terminals and the second plurality of communication terminals further being adapted to exchange messages in encrypted form.

According to a particular embodiment of the invention the first memory means are implemented in the form of IC logic micro-structures.

According to still another embodiment of the invention, the first plurality of communications equipment further comprise coupling means operable at will and temporarily, via a coupling interface, to couple at least one equipment of the first plurality of communications equipment with an independent data recording device placed at a fixed location, said data recording device comprising means for reading the contents of said first memory means comprised in said equipment of the first plurality of communications equipment when said equipment of the first plurality of communications equipment is coupled to said data recording device, and means for writing data into said first memory means of said equipment of the first plurality of communications equipment.

In another embodiment of the invention, the first type message sent by at least a first equipment of said first plurality of communications equipment to at least a second equipment of said second plurality of communications equipment, comprises a request to increase a value stored in said first memory means by a certain amount,

the data transfer control means of said second equipment is further adapted to accede said second memory means in order to decrease a value stored in said second memory means by said certain amount and send to said first equipment a third type message comprising an indication to increase the value stored in the first memory means, and

the data transfer control means of said first equipment is further adapted to accede said first memory means in order to increase a value stored in said first memory means by said certain amount and to send to said second equipment a second type message comprising an indication that said first memory means have been modified.

According to another advantageous embodiment of the invention, the first type message sent by said first equipment of said first plurality of communications equipment to said second equipment of said second plurality of communications equipment and comprising a request to increase a value stored in said first memory means by a certain amount, is sent automatically when the value stored in said first memory means is below a certain threshold.

According to still another embodiment of the invention, the first type message sent by at least a first equipment of said first plurality of communications equipment to at least a second equipment of said second plurality of communications equipment, comprises a request to increase a value stored in said second memory means by a certain amount,

the data transfer control means of said second equipment is further adapted to accede said second memory means in order to increase said value stored in said second memory means by said certain amount and to send a third type message to said first equipment comprising an indication to decrease a value stored in said first memory means, and

the data transfer control means of said first equipment is further adapted to accede said first memory means in order to decrease the value stored in said first memory means by said certain amount and to send a second type message to said second equipment comprising an indication that said first memory means have been modified.

Advantageously, the first, second and third type messages further comprise an identification number and that the data transfer control means of said first plurality of communications equipment and said second plurality of communications equipment are further adapted to record said identification number, check if said messages arrive in a determined message flow protocol order and record any disruption event of said message flow protocol order.

In another advantageous embodiment, the data transfer control means of said first plurality of communications equipment and said second plurality of communications equipment are further adapted to detect when a certain number of disruption events has been reached and to generate and send a system synchronization request to clear the status of a certain number of electronic data transfer protocols.

In still another embodiment of the invention, the data transfer control means of said first plurality of communications equipment is further adapted to exchange control information with display control means in order to provide an operations menu in said first plurality of communications equipment, said operations menu displaying electronic data transfer options available to the user, current and historic information about electronic data transfers, electronic data stored in said first memory means and error or success electronic data transfer messages.

According to another specific configuration of the invention, the second plurality of communications equipment comprise at least a dedicated electronic transaction communications server adapted to receive and transmit all transaction requests from and to said first plurality of communications equipment, said second plurality of communication equipment being connected to a central electronic transaction server adapted to encrypt/decrypt communication with the first plurality of communication terminals with the aid of a key management server and adapted to authenticate, accede and modify a value of at least one said second memory means comprised in a virtual electronic wallet application server.

According to another advantageous embodiment of the invention, the value to be modified in said first memory means and/or in said second memory means is a value indicating an amount of money owned by the user in electronic form.

The invention relates also to a method implemented in a system according to any of the embodiments indicated above.

The invention covers also a portable electronic communications device comprising

- first memory means containing a certain amount of money in electronic form corresponding to a user's electronic money purse,
- wireless coupling means to couple via a first wireless interface, advantageously using RFID or analogous technology, with independent data recording devices placed at fixed locations, for paying for products or services,
- wireless communication means to communicate via a second wireless interface with a communications network, and
- data transfer control means adapted to generate and send request messages to the communications network for transferring an amount of electronic money between network second memory means comprising said user's electronic money account, and said first memory means.

Advantageously, the communication between the portable electronic communications device and the communications network is encrypted and the electronic transactions are authenticated so as to allow proper transactions to occur only between mutually authorized devices.

According to another advantageous embodiment, said wireless interface between the portable electronic communications device and the communications network allows for communication over at least ten meters. This can be achieved for example using GSM, UMTS or analogous mobile phone communications technology, or even Bluetooth or WLAN technology.

According to still another embodiment of the invention the request of said portable electronic communications device is a request to refill said memory means of said portable electronic communications device and in response of which the communications network transfers a value representative of an amount of money in electronic form to said memory means of said portable electronic communications device.

Advantageously, said request is sent automatically to the communications network when the electronic value stored in said memory means of said portable electronic communications device is below a predetermined threshold value.

According to another embodiment, the request of said portable electronic communications device is a request to transfer a value representative of an amount of money in electronic form from said memory means of said portable electronic communications device to memory means of said communications network.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be better understood and further advantages will become apparent from the following description of illustrative embodiments.

Figure 1 is a general schematic view of a system for electronic commerce transactions according to an embodiment of the invention.

Figure 2 shows a first exemplary implementation of a system for electronic commerce transactions according to an embodiment of the invention.

Figure 3 shows a second exemplary implementation of a system for electronic commerce transactions according to an embodiment of the invention.

Figure 4 is a first exemplary message flow chart for transferring electronic money to a user's E-Purse from said user's network E-wallet account according to an embodiment of the invention.

Figure 5 is a second exemplary message flow chart for transferring electronic money to a user's E-Purse from said user's network E-wallet account according to an embodiment of the invention.

Figure 6 is a third exemplary message flow chart for transferring electronic money to a user's E-Purse from said user's network E-wallet account according to an embodiment of the invention.

Figure 7 is an exemplary message flow chart for transferring electronic money to a user's network E-wallet account from said user's E-purse according to an embodiment of the invention.

Figure 8 shows a general credit transaction message flow between a user's mobile device and the network according to an embodiment of the invention.

Figure 9 shows a general debit transaction message flow between a user's mobile device and the network according to an embodiment of the invention.

Figure 10 is a first demonstrative management scenario of a disrupted transaction message flow between a user's mobile device and the network according to an embodiment of the invention.

Figure 11 is a second demonstrative management scenario of a disrupted transaction message flow between a user's mobile device and the network according to an embodiment of the invention.

Figure 12 is a third demonstrative management scenario of a disrupted transaction message flow between a user's mobile device and the network according to an embodiment of the invention.

Figure 13 shows a first demonstrative transaction synchronization flow between a user's mobile device and the network according to an embodiment of the invention.

Figure 14 shows a second demonstrative transaction synchronization flow between a user's mobile device and the network according to an embodiment of the invention.

Figure 15 is an illustrative flow chart of a user's mobile device initiating a transaction request.

Figure 16 is an illustrative flow chart of a network receiving a transaction request.

Figure 17 is an illustrative flow chart of a user's mobile device receiving a transaction response.

Figures 18 A, B, C, D, E show an exemplary SIM Toolkit menu for managing electronic money transactions with a mobile phone according to an embodiment of the invention.

Figures 19 A to K show an exemplary SIM Toolkit menu implementation for setting and activating the automatic refill function.

Figures 20 A to D show an exemplary SIM Toolkit menu implementation for deactivating the automatic refill function.

Figures 21 A to E show an exemplary SIM Toolkit menu implementation for checking status of the automatic refill function and the automatic refill parameters setting.

Figure 22 shows a message flow chart for refilling automatically the user's mobile device E-Purse according to an embodiment of the invention.

DETAILED DESCRIPTION OF ILLUSTRATIVE EMBODIMENTS

General electronic money transaction system overview.

Figure 1 shows a general schematic diagram of a system for electronic commerce transactions according to an embodiment of the invention, comprising a point of sales terminal PT connected to a merchant's server MS within the merchant's premises MP, a first wireless interface W1, a user's mobile device UMD comprising an electronic money purse EP, a second wireless interface W2, a network N and a network server NS comprising an user's electronic money account EW.

For the purposes of this invention and in the following description we will refer to the electronic money purse EP implemented or comprised within the user's mobile device UMD as an "E-purse" and to the user's network electronic money account EW as an "E-wallet". The E-purse shall be understood as the means comprised in a mobile device UMD for storing a certain user electronic money data and the E-wallet as the means comprised in a network N, e.g. a database, for storing such user electronic money data. Usually a user opens an E-wallet account with a certain broker or bank entity and said E-wallet account is used to buy products or services via many different channels such as mobile STK or USSD technology, on-line Internet sessions or telephone connections. The E-purse shall be understood as the means comprised in the user's mobile device UMD which allow said user to pay commodities or services in person, that is, as could

have been done at a merchant's premises, or a merchant's point of sale terminal, with cash, a credit card or a smart card. In fact, the E-purse according to an embodiment of the invention is similar to known prior art electronic payments with, for example, an E-purse smart card, that is, the user will be able to pay, with the aid of wireless coupling means present in the user's mobile device UMD at a POS terminal PT just by holding said mobile device UMD close to said POS terminal PT. Generally said payment will be carried through a first wireless communication interface W1 using known RFID coupling/communication technology between the POS terminal PT and a smart-like IC micro structure present in the mobile device, but the system of invention is not limited to these type of RFID payments and according to another embodiment of the invention said payment may be done through a wireless interface W1 using other wireless communication technologies, e.g. Bluetooth, GSM or WLAN. So the E-purse can be imagined as the user's "mobile" electronic money or an amount of money stored in electronic form in a memory inside the mobile device and which the can carry with him anywhere anytime for making purchases and the E-wallet as the user's "fixed" electronic money account confined at a certain bank or broker network premises.

As is known from prior art E-purse smart IC card applications, the user will need to refill said IC card with electronic money data when his E-purse money balance reaches zero or is insufficient to accomplish the purchase of a desired product. According to the invention, the user will be able to refill his E-purse EP when desired, that is, anywhere and anytime, just by sending a wireless request to the network N, in which his E-wallet EW is comprised, from his mobile device UMD. According to an embodiment of the invention, any time the user desires to refill his E-purse EP with a certain amount of electronic money, he will instruct his mobile device UMD to send a refill request via wireless interface W2 to the network N, the network will recognize such refill request and will validate the transfer of the desired amount of electronic money to the mobile device E-purse. This may be done for example, after authenticating the user and checking that he can access the network E-wallet account, by modifying the value of the user's network electronic account balance (e.g. subtracting a certain amount to the balance) and providing a response to the mobile device to modify the balance of the E-purse

accordingly (adding a certain amount to the E-purse balance). According to another embodiment of the invention said E-purse refill will be done automatically, and the users can set the balance threshold for initiating the automatic refill and the refill amount. According to another embodiment of the invention, the user will be also able to transfer electronic money from his E-purse to his E-wallet network account when desired.

The network N may be a bank or broker's network, a telecommunications operator's network or a combination of such communications networks, which comprises at least one network element, e.g. a server NS, able to receive the user's mobile device UMD wireless transactions requests, manage the user's network E-wallet account EW and provide the corresponding responses to the user's mobile device according to the invention. The wireless interface W2 between the user's mobile device UMD and the network N may be implemented according to any current state of the art wireless technologies e.g. Bluetooth, SMS, MMS, WAP, WLAN, which allow for short and long range (over ten meters) transfer of information between a mobile device and a network access element. The user's mobile device UMD may be a mobile phone, a notebook or any other device which can be carried by the user and communicate wirelessly with a network.

According to another embodiment of the present invention, the user, with the aid of a mobile device UMD, can check the electronic money balance of his E-purse, obtain information about the last electronic commerce transaction or transactions performed, transfer money from his E-wallet account EW onto his E–purse EP and/or transfer electronic money from the E-Purse EP to his E-wallet account EW. According to still another embodiment of the invention, the user's mobile device UMD is a mobile phone that comprises a multi-functional IC card, which is both a SIM (Subscriber Identity Module) card and a smart-like card for RFID payment and electronic money balance storage purposes.

Electronic money transaction system architecture examples.

Figure 2 shows a first exemplary architecture diagram of a system for electronic commerce transactions according to an embodiment of the invention, comprising a user's mobile device UMD with an E-purse EP, a wireless interface W2 and a network N comprising an user's E-wallet account EW and four network elements or servers S1 to S4.

The first server S1 may be a communications network server dedicated to electronic money transactions. All electronic money transaction requests from the user's mobile device UMD can be therefore addressed to and handled by this server, which will then redirect them to the other corresponding electronic commerce transaction servers of the network N. The first server S1 may be, for example, an SMS (short message service) gateway dedicated to receive the SMS message requests sent by the user's mobile device UMD to start an electronic money transaction. Said user's mobile device transaction request may be then redirected to a second application server S2 or central electronic transaction server in charge, for example, of managing encryption/decryption of the over the air and network communication with the user's mobile device, managing user's authentication and debit and credit money transactions in connection with two other servers, namely, an E-wallet application server S4 and a key management server S3. The key management server S3 provides, for example, encryption/decryption keys to credit or debit the E-purse EP on a user's mobile device UMD. The E-wallet application server S4 manages data related to the user's network electronic money account EW. With the authentication data received from the central electronic transaction server S2 and the amount of money debited or credited, the E-wallet application server S4 can update the balance of the user's electronic money account EW.

Although not shown in the figure, it is also possible to provide a computer connection to the central electronic transaction server S2 and/or the E-wallet application server S4 for customer management, accounting and business purposes, that is, the network operator, bank or broker may wish to obtain and manage information related to all the electronic transactions carried, all the users and their network electronic money accounts. The broker may, for example decide to provide a certain reward or bonus to some users which

meet a determined transaction history profile or limit their credit or maximum electronic transaction amount.

Figure 3 shows a second exemplary architecture diagram of a system for electronic commerce transactions according to an embodiment of the invention, comprising a user's mobile device UMD with an E-purse EP, a wireless interface W2, a first network N1 comprising a first user's E-wallet account EW1 and five network elements or servers S1 to S5 and a second network N2 comprising a second user's E-wallet account EW2.

Figure 3 comprises a similar structure as the one shown in Figure 2 but for the fact that two different electronic money accounts EW1 and EW2 may be present in two different networks N1 and N2. This may be advantageous in applications in which a certain communications operator, bank or broker establishes one or more electronic commerce transaction business partnerships. In these electronic money transaction application scenarios, the first network N1 may interact with the second network N2 in order to accede to a user's second electronic money account EW2. For this purpose, the E-wallet application server S4 of the first network N1 is connected to a communications gateway S5 in charge of establishing electronic money transaction connections with the e-commerce business partner network N2. It is also possible that the business partner network N2 provides information to the communications gateway S5 that the user has in that network a certain amount of money (e.g. a bank or credit card account) or has paid a certain amount of money for a certain service (e.g. a prepaid service) and the communications gateway S5 converts such amount into electronic money and settles the payment with the business partner network N2 after the electronic transaction.

It shall be noted that Figures 2 and 3 just show a certain exemplary architecture of some of the network elements present in the communications network or networks which interact with the user's mobile device for carrying out the electronic money transactions between the user's E-purse and the user's network E-wallet. It is understood that the same above indicated server functionalities could be implemented in the network using a different amount of servers or server connections.

Transfer of electronic money from the user's E-wallet to the user's E-purse. Refill E-purse scenarios.

As already indicated above and according to the invention, the user will be able to refill his mobile device E-purse when desired and when a wireless access network is available for communication. The user will not be forced to go to a specific refill terminal, as was the case when using an E-purse smart card.

Figure 4 shows a message flow chart for carrying an electronic money transfer from the user's network E-wallet account to the user's mobile device E-Purse according to an embodiment of the invention. According to the example of the figure, the user carries the E-purse refill using a mobile phone. The mobile phone comprises means to display a "refill E-purse" option in the phone's display (by way for example of a SIM toolkit implementation) and when the user selects this option a mobile phone's plug-in is activated which generates and sends a Request SMS message to the network. The network will then acknowledge the transfer of money to the mobile phone's E-purse and update the user's electronic money account accordingly.

Figure 5 shows a second message flow scenario for transferring electronic money to a user's E-Purse from said user's network E-wallet account according to an embodiment of the invention. According to the example of the figure, the user carries the E-purse refill using a mobile phone and from a bank or credit card account in a network not belonging to his E-purse provider, as was explained in Figure 3. The message flow is similar as the one shown in Figure 4 but for the fact that some message parameters are different, e.g. information about the user's credit or bank account, and for the presence of a new network element, the communications gateway S5 in charge of settling the electronic money transfer with the bank or credit account entity.

Figure 6 is a third exemplary message flow chart for transferring electronic money to a user's E-Purse from said user's network E-wallet account according to an embodiment of the invention. According to the example of the figure, the user carries the E-purse refill using a mobile phone and from a prepaid cash card account in a network not belonging to

his E-purse provider, as was explained in Figure 3. The electronic money transaction message flow is very similar to the message flow shown in Figure 5 but for the fact that some message parameters are different, e.g. information about the user's cash card account, and that the communications gateway S5 is a prepaid gateway.

In general, for the purposes of electronic money transfer according to the invention, the user's mobile device UMD comprises data transfer control means connected to first memory means which contain at least a user's electronic money balance and correspond to the user's portable electronic purse EP, and wireless communication means for communicating via wireless interface W2 with the communications network N. The network comprises second data transfer control means, e.g. servers S1 to S5, being located each at fixed locations in said communication network, and second memory means that contain at least one user's electronic money account and correspond to the user's network electronic wallet EW. For the purposes of the transaction the user's mobile device UMD sends generally two types of messages to the network N, a message of a first type (A in the Figures) being a request to start a transaction between the portable electronic purse EP and the network electronic wallet EW, and a message of the second type (C in the Figures) being an acknowledge message indicating to the network that the electronic purse balance has been modified. The network, on the other hand will generally receive the message of the first type from the mobile device and provide a message of a third type, which is a response transaction message (B in the Figures) indicating to the mobile device if the electronic purse balance may be modified. The transaction response message B from the network will depend for example on data included in the message of the first type received from the mobile device, for example, on user identification data and on the amount of electronic money to be transferred. If, for example, the user is not allowed to access a determined electronic wallet or the identification and authentication of the user is incorrect, or the amount to be transferred is over a certain limit or there is not enough money in the user's electronic wallet EW, the network will provide a transfer error message to the mobile device and the transaction will not be carried.

According to the examples of Figures 4 to 6 the user uses the SIM Toolkit menu in the mobile phone UMD to initiate a transaction with the network containing his E-wallet in order to refill his mobile device E-purse, and introduces a refill amount and his PIN (Personal Identification Number). Then a data transfer control function inside the mobile phone, in connection with the mobile phone's multi-function IC card, generate a message with the information introduced by the user and some attached information, as for example, the user's command or request to refill the E-purse (from his network E-wallet or a Bank/Credit Card/Cash card), encryption information, transaction information, other mobile phone or E-purse identification information, bank/credit card or cash card information in case this option has been chosen.

After the message has been generated and information about the new transaction has been registered in the mobile phone's IC card or in any other memory, the mobile phone UMD sends this message in the form of one or more SMS to the communications network where servers S1 to S4 are located. The first server S1 which receives the transaction request message A from the mobile phone is, for example, an SMS gateway which identifies the message as an electronic transaction an redirects said message to a second application server S2 or central electronic transaction server in charge of dealing with such transactions. The central electronic transaction server will then decrypt the SMS message or messages received according to a certain encryption key, such as for example, a SIM key, and check if the transaction message corresponds to a new transaction or has a relation with a transaction in process, e.g. by checking the transaction identifier, and also check, in case a certain number of transactions has not been cleared or a certain number of protocol disruption events has been reached, if a synchronization is needed with the mobile phone UMD. Then the central electronic transaction server S2 will establish a communication session with the E-wallet application server S4, for example, using a mobile station integrated services digital network (MSISDN) service, in order to check, for example, if the PIN introduced by the user permits the access to said user's E-wallet, if the amount of money requested by the user is present in said user's E-wallet and if the amount of money does not exceed a certain limitation.

In case the user has selected to refill his E-purse from a certain bank account, credit card account or cash prepaid card, said information is given to the E-wallet application server S4, which in turn establishes a communication with a communications gateway S5 in charge of dealing with or the settlement process with said certain bank account, credit card account or cash prepaid card.

In case the previous verifications in connection with E-wallet application server S4 and eventually with the communications gateway S5, are successful, the central electronic transaction server S2 proceeds with a request to the E-wallet application server S4 to update the user's E-wallet, e.g. decrease the amount of electronic money balance by the amount indicated by the user.

Once the E-wallet application server S4 provides the acknowledge of the successful modification of the user's E-wallet account, the central electronic transaction server S2 requests an E-purse credit key to the key management server S3.

After receiving the credit key for the E-purse, the central electronic transaction server S2 sets the status of the current transaction as pending, and generates, encrypts and sends a response transaction message to the SMS gateway S1. The transaction response message sent from the central electronic transaction server S2 to the SMS gateway S1 may be already sent in the form of one or more SMS messages or in any other suitable form, and the SMS gateway S1 may be in charge of adapting the transaction response messages received from the central electronic transaction server S2 in the for of one or more short messages B to be sent to the user's mobile phone UMD.

The transaction response message B received by the user's mobile phone contains at least transaction information such as, for example, a transaction identifier and a transaction network result and credit key information.

Once the user's mobile phone UMD receives the transaction response message B from the network it decrypts the SMS messages checks if the transaction response corresponds

to the current transaction in process, credits the E-purse, e.g. increases the electronic money balance with a certain amount of money, sets the status of the mobile phone transaction process to idle and generates and sends a transaction acknowledge message C to the network.

When the central electronic transaction server S2 receives the acknowledge message from the mobile phone UMD, it validates that the transaction has been carried correctly and said transaction is cleared indicating that that said transaction has been successful. Finally, the credit key data received in said acknowledge message C is sent to the key management server which also clears said transaction credit key.

Automatic refill of the user's mobile device E-Purse.

According to another embodiment of the invention the user's mobile device E-purse can be refilled automatically from his network E-wallet account, when, for example, the balance of the E-purse falls below a certain threshold. This avoids the need for the user to move to a refill agent, kiosk, shop or store for refilling his E-purse. Also, this avoids the need for the user to continuously check his E-purse balance and assures that the E-purse will contain a certain minimum predetermined amount of money.

Because the current dual interface SIM and SIM Toolkit menu do not have any timer recurring function for timely managing the amount of money available (whether it is under a threshold which triggers the refill from the E-wallet account to the E-Purse), the automatic refill function, according to a particular embodiment of the invention, comprises the following steps:

- comparing the current E-Purse balance with a predetermined threshold;
- detecting if the current E-Purse balance is lower than the predetermined threshold;
- if the current E-Purse balance is lower than the predetermined threshold, then transferring money from the network E-wallet account to the E-Purse (i.e. refilling is activated);
- otherwise, no refilling is conducted.

According to an embodiment of the invention the user can activate or deactivate the automatic refill function of his mobile device E-purse, set the threshold and refill amount and check the current automatic refill settings.

According to an embodiment of the invention, the user sets the parameters of the automatic refill function via a mobile SIM Toolkit menu.

As explained in detail below, in a particular embodiment of the invention, the trigger of the automatic refill function can be done per the following events; 1) Location update on SIM, 2) Customer press root menu on SIM Toolkit menu, namely "Touch" and 3) Customer press confirm at the end process of setting automatic refill function to "ON". According to an embodiment of the invention, the first event 1) does not involve any button pressing, but the second 2) and the third 3) events are activated per pressing of the yellow highlight button.

Figures 19 A to K show a mobile SIM Toolkit menu implementation for setting and activating the automatic refill function. After a location update on SIM card (**Figure 19 A**), a main page is displayed on the user's mobile device screen (**Figure 19 B**). The user selects and clicks on the icon named "Menu" of the main page. This action of the user causes the mobile SIM Toolkit menu to be displayed on the user's mobile device screen (**Figure 19 C**). The user then selects and clicks on the icon named "Touch" of the SIM Toolkit menu. This action of the user causes a "transaction menu" to be displayed on the user's mobile device screen (**Figure 19 D**). For example, from this "transaction menu", the user can check his E-Purse balance, refill his E-Purse, query his last transaction information, or transfer money from his network E-wallet account onto his E –purse and vice versa, from the E-purse to the network E-wallet account. When the user selects and clicks on the icon named "Refill purse" of the "transaction menu", a "refill menu" is displayed on the user's mobile device screen (**Figure 19 E**). In order to set the parameters of the automatic refill function, the user selects and clicks on the icon named "Set auto refill" of the "refill menu". To activate the automatic refill function, the user selects and clicks on the icon named "ON" (**Figure 19 F**). After activating the automatic refill

function, the user is requested to set a first parameter corresponding to a threshold value of the E-Purse balance (**Figure 19 G**). For example, the user can set this threshold value at 20 Baht. Thus, when the current E-Purse balance of the user is under 20 Baht, a refill transaction is effected.

After setting the first parameter, the user is requested to set a second parameter corresponding to a refilling amount (**Figure 19 H**). For example, the user can set this refilling amount at 300 Baht. Thus, for each refill transaction, an amount of 300 Baht is transferred from network E-wallet account to E-Purse. After setting the second parameter, the user is requested to set a third parameter corresponding to a password (**Figure 19 I**). For example, this password is a personal identification number (PIN) that will be used by the network to authenticate the user. According to the invention, the password is securely stored on the SIM card. According to an embodiment of the invention, ADM (GSM11.11 standard) is used for protecting the file containing the password. Access to the file requires an authorized attempt, with a limit of 3 attempts.

After setting the above-mentioned parameters, a confirmation request is displayed on the user's mobile device screen (**Figure 19 J**). The user can either selects and clicks on the icon "OK" to validate the settings and activate the automatic refill function, or on the icon "Cancel" to cancel the settings. Finally, if the user clicks on the icon "OK", a SMS is sent to the network (**Figure 19 K**). According to an embodiment of the invention, if the predetermined threshold is not reach, then the SIM remains on the idle state and the automatic refill is not performed. On the other hand, if the predetermined threshold is reached, then a SMS is sent out to Server for refilling the money onto the purse.

Figures 20 A to D show a mobile SIM Toolkit menu implementation for deactivating the automatic refill function. As previously described, when the user selects and clicks on the icon named "Refill purse" of the "transaction menu" (**Figure 20 A**), a "refill menu" is displayed on the user's mobile device screen (**Figure 20 B**). In order to deactivate the automatic refill function of his mobile device E-purse, the user selects and clicks on the icon named "Set auto refill" of the "refill menu", then selects and clicks on the icon

named "OFF" (**Figure 20 C**). Finally, a confirmation message (for confirming the deactivation of the automatic refill function) is displayed on the user's mobile device screen (**Figure 20 D**).

Figures 21 A to E show a mobile SIM Toolkit menu implementation for checking status of the automatic refill function (ON or OFF) and the automatic refill parameters setting.

As previously described, when the user selects and clicks on the icon named "Refill purse" of the "transaction menu" (**Figure 21 A**), a "refill menu" is displayed on the user's mobile device screen (**Figure 21 B**). In order to check status of the automatic refill function, the user selects and clicks on the icon named "Set auto refill" of the "refill menu", then selects and clicks on the icon named "Check status" (**Figure 21 C**). Finally, if the automatic refill function is activated (ON), a first current setting message type is displayed on the user's mobile device screen (**Figure 21 D**). On the contrary, if the automatic refill function is deactivated (OFF), a second current setting message type is displayed on the user's mobile device screen (**Figure 21 E**).

Figure 22 shows a message flow chart for refilling automatically the user's mobile device E-Purse according to an embodiment of the invention. According to the example of figure 22, when the mobile device (UMD) detects that the current E-Purse balance is lower than a predetermined threshold value (previously set by the user), the mobile device initiates automatically a refill transaction. The mobile device sends a credit request in SMS format to the central electronic transaction server S2. On reception of such credit request, the central electronic transaction server S2 sends a login message to the E-wallet application server S4, and waits for a response from the E-wallet application server S4. When the central electronic transaction server S2 receives a login response from the E-wallet application server S4, the central electronic transaction server S2 starts sending data to the key management server S3. After analyzing the data from the central electronic transaction server S2, the key management server S3 sends data to the central electronic transaction server S2. On reception of such data, the central electronic transaction server S2 sends a E-wallet debit request to the E-wallet application server S4,

and waits for a response from the E-wallet application server S4. When the central electronic transaction server S2 receives a E-wallet debit response from the E-wallet application server S4, the central electronic transaction server S2 sends a credit response in SMS format to the mobile device (UMD). The mobile device then notifies the user of the successful refilling of his E-Purse, by displaying a message on the mobile device screen.

Therefore, when the automatic refill is activated, the user can pay with his E-purse and not worry about the minimum amount of money present in his E-purse each time. The mobile device will continuously check the balance of the E-purse and send a refill request to the network when necessary. Moreover with the auto-refill function, customers are no longer required to put a large amount of money in their E-purses as they will automatically refill when it reaches a threshold, what additionally means that the customers are more protected when they lose their mobile devices or their mobile phone is stolen since they will not have a great amount of money inside the E-purse. The user can further contact the call center of the company providing the E-purse application and block the E-purse.

Transfer of electronic money from the user's E-purse to the user's E-wallet.

According to another embodiment of the invention, the user is able not only to transfer money to his E-purse from his network E-wallet account, but also, if needed, to transfer electronic money from his E-purse to his network E-wallet account.

Figure 7 shows a message flow chart for carrying out an electronic money transfer from the user's mobile device E-purse to the user's network E-wallet account according to an embodiment of the invention. According to the example of the figure, the user carries the transfer of money to his network E-wallet account using a mobile phone UMD. The mobile phone comprises means to display, for example, a "transfer to E-wallet" option in the phone's display (by way for example of a SIM toolkit implementation) and when the user selects this option a mobile phone's plug-in is activated which generates and sends a Request SMS message A to the network N, which comprises servers S1 to S4 as can be

seen in Figure 2. The network will then verify the request, provide a response B to the mobile phone with the corresponding certifications and an indication that the transfer can be continued and the E-purse debited. When the mobile device has debited the E-purse, e.g. the balance is decreased by a certain amount, it acknowledges this to the network with an acknowledge message C and the network validates the transfer of electronic money and updates the balance of the user's electronic money account EW accordingly.

Normal credit or debit transaction message flow examples.

Figures 8 and 9 show two examples of normal transaction message flows between the user's mobile device UMD and the network N. **Figure 8** shows a normal E-purse credit transaction flow, i.e. an E-purse refill scenario and **Figure 9** shows a normal E-purse debit transaction flow or transfer of money from the E-purse to the network E-wallet account.

According to an embodiment of the invention a software application on the mobile phone's multi-function IC card is in charge of providing all or part of the functionality indicated in the figures. The network provides the corresponding credit or debit key certificates to credit or debit the E-purse.

According to an embodiment of the invention, the network, e.g. a network server, keeps record of the following electronic transaction system information:

1. Transaction identifier code (transaction ID)
2. Transaction type (e.g. credit/debit)
3. Transaction amount
4. Date/Time of transaction
5. Mobile device or user's E-purse identifier
6. Server transaction result
7. Mobile device transaction result
8. Secure check code
9. Transaction status (e.g. pending/cleared)

Further, each transaction event is carefully registered and controlled.

Management of transaction message flow disruptions.

Figures 10, 11 and 12 show three demonstrative management scenarios of disrupted transaction message flows between a user's mobile device UMD and a network N according to the invention. As credit (refill E-purse) and debit (transfer from EP to EW) transaction flows between the user's mobile device and the network have the same structure, Figures 10 to 12 just use E-purse refill transaction message flows for showing how flow disruptions are managed.

Figure 10 shows how to manage a disrupted credit transaction response. It shall be noted that when the transaction log is full, no new transactions are allowed until the network synchronizes with the card and clears all pending transactions. This is to ensure data consistency throughout the system.

According to the figure, a first transaction T1 is initiated when the user's mobile device UMD sends a first transaction request A1 to the network N. The mobile device will register a code associated to said first transaction T1, for example as '0000', and set its state so as to wait for a transaction response message B1 from the network. In case the mobile device does not receive a transaction response message B1 within a certain time or the user decides to cancel said current first transaction T1, the mobile device modifies the first transaction code to '6501' indicating that the first transaction T1 has to be aborted. On the other hand, the network N, after sending the transaction response message B1, registers a transaction result for said first transaction T1 as 'pending' and sets its state so as to wait for a transaction acknowledge message from the mobile device. The user will initiate a second transaction T2 by sending second transaction request A2 to the network N, and the mobile device will register a code associated to said second transaction T2, for example as '0000', and set its state so as to wait for a second transaction response message B2 from the network. The network N, follows by sending a second transaction response message B2 and registers a transaction result for said second transaction T2 as 'pending' and sets its state so as to wait for a transaction acknowledge message from the mobile device. In the meantime the network N has identified that the

first transaction T1 has been aborted (this information may be sent for example by the mobile device in the second transaction request message A2) and so it registers a transaction result for said first transaction T1 as 'reverted', indicating that the first transaction has not been successful due to a disruption of the normal transaction flow protocol. Finally, when the network receives a transaction acknowledge message C2 corresponding to the second transaction, the network registers a transaction result for said second transaction T2 as 'cleared', indicating that said transaction has been successful. Reverted means that the transaction is rolled back or put to a previous state, for example, if a server of the network is expected to generate a credit key for the E-purse of e.g. five euros, when the transaction is reverted, the money (the five euros) is returned to the networks electronic account. In case of a reverted transaction, the credit of the E-purse is not successful. When a transaction is successful, such transaction is cleared.

Figure 11 shows how to manage a disrupted credit transaction acknowledge. In the examples of the figure, it is assumed that the credit response returned is correct, and when a correct credit response is returned, it is assumed that the previous transaction logs are verified and can be cleared.

According to an embodiment of the invention, in case the network in unable to resolve pending transactions or backlog, it sends a "Transaction Error (Halt)" response to the user's mobile device indicating that all processes shall be halted, that is, the user's mobile device electronic transaction process will be locked, and the mobile device will display a transaction error message inviting the user to approach a customer service center to resolve the issue. In this scenario, the transaction logs will not be cleared until the user contacts the customer service.

If no acknowledge message from the mobile device UMD has been received by the network side N, there are two possibilities

1. the network N may wait for a new transaction request from the mobile device UMD and this new message will contain an indication of the status of the last transaction, or

2. it is also possible to start a synchronization between the mobiles device and the network side.

Figure 12 shows how to manage an out of order credit transaction request. The example of the figure describes a situation where due to network buffer and switching, the user's mobile device request message did not arrive in the order expected.

Electronic transaction synchronization flow examples.

As indicated above in Figures 10 to 12, every time a transaction event or disruption occurs, it will be logged or stored in a memory inside the user's mobile device. According to an embodiment of the invention, in cases in which said memory is limited in space, and the memory reaches its limit, a synchronization between the user's mobile device and the network is carried before any new transaction begins.

Figure 13 shows an example of a synchronization initiated by the user's mobile device when the log memory limit is reached.

According to another embodiment of the invention, a synchronization event can be initiated by the network, for example, when certain transactions needs to be verified immediately.

Figure 14 shows a network-initiated synchronization event.

According to an embodiment of the invention, for synchronization, the mobile device and the network exchange the status of the last five transactions. The network will trust the transaction status logged on the mobile device so as to update the transaction records for having the same status.

Mobile device and network illustrative transaction process flowcharts.

Figures 15 to 17 show three illustrative examples of the processes carried out inside the user's mobile device to either initiate an electronic transaction request or receive a

request response from the network (Figures 15 and 17) and inside the network when an user's mobile device transaction request is received (Figure 16).

Figure 15 shows a user's mobile device process when initiating a new electronic transaction request. According to the example of the figure, the user's mobile device sends a transaction request to the network in the form of an SMS message. Generally, the process starts by inquiring the current state of the transaction process, in case the state is idle, it is checked if a synchronization with the network is needed, and after that, the transaction request SMS is created. Although not shown in the figure the transaction request SMS will be sent to the network after the process is finished. Said SMS message may be sent in encrypted form for securing the communication. In the event that an irresolvable error or transaction takes place, the process will be locked to prevent further corruption.

Figure 16 shows a network server process when receiving a user's mobile device transaction request. According to the example of the figure, the user's mobile device sends a transaction request to the network in the form of an encrypted SMS message. Generally, the process starts by decrypting the SMS, checking if a transaction synchronization is needed, performing the transaction, i.e. updating the user's E-wallet account, and generating the appropriate certificate, setting the transaction result and logging the result in a database or memory. The transaction result is indicated by a certain code that may indicate a normal successful transaction or a transaction error, e.g. balance overflow, irresolvable error, etc. If the server is unable to resolve pending transactions or backlog, it will send a specific transaction result code to the user's mobile device in order to halt all transaction processes and invite the user to contact the customer service center to resolve the issue.

Figure 17 shows a user's mobile device process when receiving a network transaction response. Generally the process starts by checking if the mobile device is currently involved in an electronic transaction processing, that is, it has sent a transaction request to the network and waits for a network response, in such case, it is checked if the transaction

response corresponds to the current requested transaction and in such case what is the electronic transaction result, e.g. successful transaction, unsuccessful transaction due to balance overflow, an irresolvable error has occurred, etc. When a successful transaction result code is received, the E-purse balance is updated and it is assumed that the server resolved all previous transactions properly, and therefore, all previous transaction log records are cleared. A transaction acknowledge packet is also created and later (not shown) sent to the network.

SIM Toolkit menu implementation examples.

Figures 18 A to E show a mobile SIM Toolkit menu implementation for carrying out electronic money transactions with a mobile phone according to an embodiment of the invention. By using the mobile SIM Toolkit menu shown in the mobile phone's display, the users can check their E-Purse balance (**Figure 18 A**), query their last transaction information (**Figure 18 B**), transfer money from their E-Wallet onto their E –purse (**Figures 18 C** and **D**) and vice versa, from the E-purse to the network E-wallet account (**Figure 18 E**). They can carry said electronic transactions anywhere and anytime, just with the aid of a mobile phone adapted to manage the user's E-purse and communicate with the network according to the invention.

The mobile phone may comprise for example a multi-function IC card, which can be used both as SIM card and E-purse card.

According to the invention, a specific computer program executed in the mobile phone or in the SIM could be in charge accessing and modifying the E-purse balance, storing transaction log information and communicating with the network that contains the user's E-wallet account.

Authentication and Encryption.

According to an embodiment of the invention authentication may be done by providing the user's electronic transaction PIN and the communication between the user's mobile device and the network may be encrypted.

Settlement process.

According to the invention, there are two ways for the settlement of electronic commerce transactions:

A. A first settlement category in which the E-purse belongs to the company that also owns the user's E-wallet account. In such case, the detail records of the E-purse will be stored on E-Purse float management for every (offline) debit and (online) credit of E-Purse, and the detail records of the E-wallet will be stored on a specific network server for every (online) debit and (online) credit of E-Wallet.

B. A second settlement category in which the E-purse belongs to a business partner company. that also owns the user's E-wallet account. In such case, the reconciliation concept will be done through sending back and forth report between both companies.

Management of a plurality of E-purses.

According to an embodiment of the invention the mobile device or multi-function IC card inside the mobile device can manage more than one user or users E-purse(s).

CLAIMS

1. A system for electronic data transfer between a first plurality of communications equipment (UMD) and a second plurality of communications equipment (S1 to S4) connected with each other by a communications network (N),

the first plurality of communications equipment (UMD) being portable electronic devices each carried by a user and each said portable electronic devices comprising first data transfer control means connected to first memory means (EP) and wireless communication means, the wireless communication means being adapted to communicate wirelessly through the communications network (N) with the second plurality of communications equipment (S1 to S4),

the second plurality of communications equipment (S1 to S4) being located each at fixed locations of a communications network (N) and comprising second data transfer control means connected to second memory means (EW),

the data transfer control means of the first plurality of communications equipment (UMD) being adapted to generate and send first and second type messages, via the wireless communication means, to the second plurality of communications equipment (S1 to S4), said first type messages comprising a request to modify a value stored in the first memory means (EP) or second memory means (EW) and user identification information and said second type messages comprising an indication that a value stored in the first memory means (EP) has been modified,

the data transfer control means of the second plurality of communications equipment (S1 to S4) being adapted to receive and analyze first and second type messages coming from the first plurality of communications equipment (UMD), to check if the user identity permits to access the second memory means (EW) and to generate and send third type messages, via wireless communication means, to the first plurality of communications equipment (UMD), said third type messages comprising an indication to modify the value stored in the first memory means (EP) or an electronic data transfer error indication,

the data transfer control means of the first plurality of communication terminals (UMD) and the second plurality of communication terminals (S1 to S4) further being adapted to exchange messages in encrypted form.

2. The system for electronic data transfer of claim 1 characterized in that the first memory means (EP) are implemented in the form of IC logic micro-structures.

3. The system for electronic data transfer of claim 2 characterized in that the first plurality of communications equipment (UMD) further comprise coupling means operable at will and temporarily, via a coupling interface (W1), to couple at least one equipment of the first plurality of communications equipment (UMD) with an independent data recording device (PT) placed at a fixed location, said data recording device (PT) comprising means for reading the contents of said first memory means (EP) comprised in said equipment of the first plurality of communications equipment (UMD) when said equipment of the first plurality of communications equipment (UMD) is coupled to said data recording device (PT), and means for writing data into said first memory means (EP) of said equipment of the first plurality of communications equipment (UMD).

4. The system for electronic data transfer of claim 1 characterized in that said first type message sent by at least a first equipment of said first plurality of communications equipment (UMD) to at least a second equipment of said second plurality of communications equipment (S1 to S4), comprises a request to increase a value stored in said first memory means (EP) by a certain amount,

the data transfer control means of said second equipment is further adapted to accede said second memory means (EW) in order to decrease a value stored in said second memory means (EW) by said certain amount and send to said first equipment a third type message comprising an indication to increase the value stored in the first memory means (EP), and

the data transfer control means of said first equipment is further adapted to accede said first memory means (EP) in order to increase a value stored in said

first memory means (EP) by said certain amount and to send to said second equipment a second type message comprising an indication that said first memory means (EP) have been modified.

5. The system for electronic data transfer of claim 4 characterized in that said first type message sent by said first equipment of said first plurality of communications equipment (UMD) to said second equipment of said second plurality of communications equipment (S1 to S4) and comprising a request to increase a value stored in said first memory means (EP) by a certain amount, is sent automatically when the value stored in said first memory means (EP) is below a certain threshold.

6. The system for electronic data transfer of claim 1 characterized in that said first type message sent by at least a first equipment of said first plurality of communications equipment (UMD) to at least a second equipment of said second plurality of communications equipment (S1 to S4), comprises a request to increase a value stored in said second memory means (EW) by a certain amount,

the data transfer control means of said second equipment is further adapted to accede said second memory means (EW) in order to increase said value stored in said second memory means (EW) by said certain amount and to send a third type message to said first equipment comprising an indication to decrease a value stored in said first memory means (EP), and

the data transfer control means of said first equipment is further adapted to accede said first memory means (EP) in order to decrease the value stored in said first memory means (EP) by said certain amount and to send a second type message to said second equipment comprising an indication that said first memory means (EP) have been modified.

7. The system for electronic data transfer of claim 1 characterized in that said first, second and third type messages further comprise an identification number and that the data transfer control means of said first plurality of communications

equipment (UMD) and said second plurality of communications equipment (S1 to S4) are further adapted to record said identification number, check if said messages arrive in a determined message flow protocol order and record any disruption event of said message flow protocol order.

8. The system for electronic data transfer of claim 7 characterized in that the data transfer control means of said first plurality of communications equipment (UMD) and said second plurality of communications equipment (S1 to S4) are further adapted to detect when a certain number of disruption events has been reached and to generate and send a system synchronization request to clear the status of a certain number of electronic data transfer protocols.

9. The system for electronic data transfer of claim 1 characterized in that the data transfer control means of said first plurality of communications equipment (UMD) is further adapted to exchange control information with display control means in order to provide an operations menu in said first plurality of communications equipment (UMD), said operations menu displaying electronic data transfer options available to the user, current and historic information about electronic data transfers, electronic data stored in said first memory means (EP) and error or success electronic data transfer messages.

10. The system for electronic data transfer of claim 1 characterized in that the second plurality of communication equipment (S1 to S4) comprise at least a dedicated electronic transaction communications server (S1) adapted to receive and transmit all transaction requests from and to said first plurality of communications equipment (UMD), said second plurality of communication equipment (S1 to S4) being connected to a central electronic transaction server (S2) adapted to encrypt/decrypt communication with the first plurality of communication terminals (UMD) with the aid of a key management server (S3) and adapted to authenticate, accede and modify a value of at least one said second memory means (EW) comprised in a virtual electronic wallet application server (S4).

11. The system for electronic data transfer of any one of claims 1 to 10 characterized in that the value to be modified in said first memory means (EP) and/or in said second memory means (EW) is a value indicating an amount of money owned by the user in electronic form.

12. A portable electronic communications device (UMD) comprising

- first memory means (EP) containing a certain amount of money in electronic form corresponding to a user's electronic money purse,
- wireless coupling means to couple via a first wireless interface (W1) with independent data recording devices (PT) placed at fixed locations, for paying for products or services,
- wireless communication means to communicate via a second wireless interface (W2) with a communications network (N), and
- data transfer control means adapted to generate and send request messages to the communications network (N) for transferring an amount of electronic money between network second memory means (EW) comprising said user's electronic money account, and said first memory means (EP).

13. A communications network (N) comprising

- memory means (EW) comprising a value representative of a certain amount of money in electronic form corresponding to a user's electronic money account,
- wireless communication means for receiving electronic money transaction request messages from a portable electronic communications device (UMD),
- means for analyzing and authenticating such transaction requests and
- means for transferring a representative value of a certain amount of electronic money between memory means (EP) of said portable electronic communications device (UMD), and the memory means (EW) accessible via said communications network (N) and comprising an electronic account of said user .

14. A computer program which can be downloaded from a communication network and/or previously stored on a computer readable medium and/or executable by a processor, characterized in that it comprises program code instructions for

- reading or writing data from/to first memory means (EP) of a user's portable electronic communications device (UMD) comprising a certain amount money in electronic form corresponding to said user's electronic money purse,
- generating and sending a request to a network (N) to initiate an electronic money transaction between said first memory means (EP) and memory means (EW) of said communications network (N) comprising said user's electronic money account,
- receiving transaction response messages from said communications network (N), and
- updating the electronic money balance of said first memory means (EP).

15. A method for electronic data transfer applicable to electronic commerce transactions, the method comprising the steps of:

- a portable electronic communications device (UMD) sending requests to a communications network (N) via a wireless interface (W2) to initiate electronic value transactions between memory means (EP) of said portable electronic communications device comprising a user's electronic money balance and memory means (EW) of said communications network (N) comprising said user's electronic account (EW),
- said communications network (N) receiving, recognizing and replying to said transaction request of said portable electronic communications device (UMD),
- said portable electronic communications device (UMD) updating said electronic money balance of said portable electronic communications device (UMD), and
- said communications network (N) updating said memory means (EW) comprising said electronic account.

16. The method according to claim 15 characterized in that the communication between the portable electronic communications device (UMD) and the

communications network (N) is encrypted and the electronic transactions are authenticated so as to allow proper transactions to occur only between mutually authorized devices.

17. The method according to claim 15 characterized in that said wireless interface (W2) allows for communication between said portable electronic communications device (UMD) and said communications network (N) at least over ten meters.

18. The method according to claim 15 characterized in that said request of said portable electronic communications device (UMD) is a request to refill said memory means (EP) of said portable electronic communications device (UMD) and in response of which the communications network (N) transfers a value representative of an amount of money in electronic form to said memory means (EP) of said portable electronic communications device (UMD).

19. The method according to claim 18 characterized in that said request is sent automatically to the communications network (N) when the electronic value stored in said memory means (EP) of said portable electronic communications device (UMD) is below a predetermined threshold value.

20. The method according to claim 15 characterized in that said request of said portable electronic communications device (UMD) is a request to transfer a value representative of an amount of money in electronic form said memory means (EP) of said portable electronic communications device (UMD) to memory means (EW) of said communications network (N).