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Koh et al.

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(54) **METHOD AND APPARATUS FOR CONDUCTING E-COMMENCE AND M-COMMENCE**

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(22) Filed: **May 28, 2013**

Related U.S. Application Data

(63) Continuation of application No. 13/400,038, filed on Feb. 18, 2012, now Pat. No. 8,448,855, which is a continuation of application No. 11/534,653, filed on Sep. 24, 2006, now Pat. No. 8,118,218.

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G06Q 20/00 (2012.01)
G06Q 20/36 (2012.01)

(52) **U.S. Cl.**
CPC ***G06Q 20/3672*** (2013.01)

(58) **Field of Classification Search**
CPC G06Q 20/04; G06Q 20/12; G06Q 20/341; G06Q 20/32; G06Q 20/382; G06Q 20/3672
USPC 235/451, 492; 340/572.1, 572.3
See application file for complete search history.

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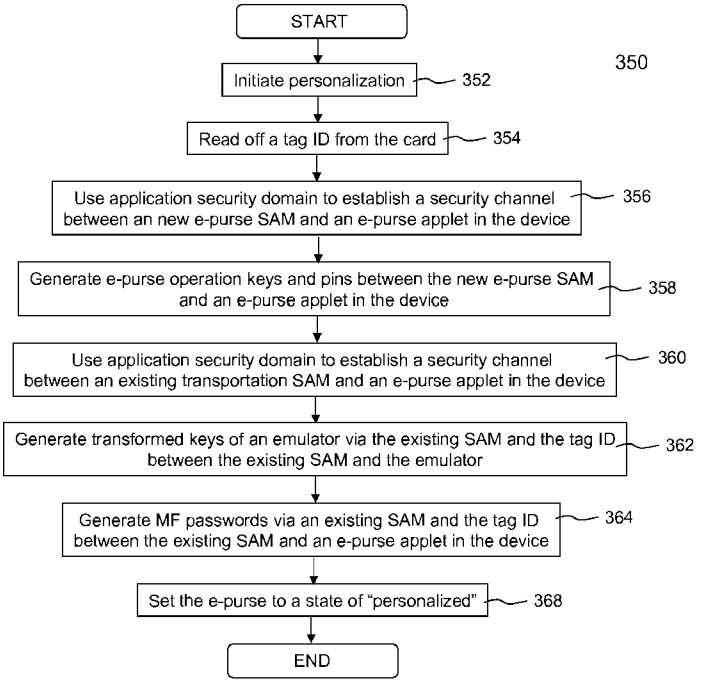
(74) *Attorney, Agent, or Firm* — Wuxi Sino IP Agency, Ltd.; Joe Zheng

(57) **ABSTRACT**

Techniques for funding an electronic purse (e-purse) are disclosed. According to one aspect of the invention, a mechanism is provided to enable a portable device to conduct transactions over an open network with a payment server without compromising security. In one embodiment, a device is loaded with an e-purse manager. The e-purse manager is configured to manage various transactions and functions as a mechanism to access an e-purse therein. The e-purse is funded by interactions among the e-purse manager, a payment server and a financial institution (its server) that maintains an account therefor.

19 Claims, 9 Drawing Sheets



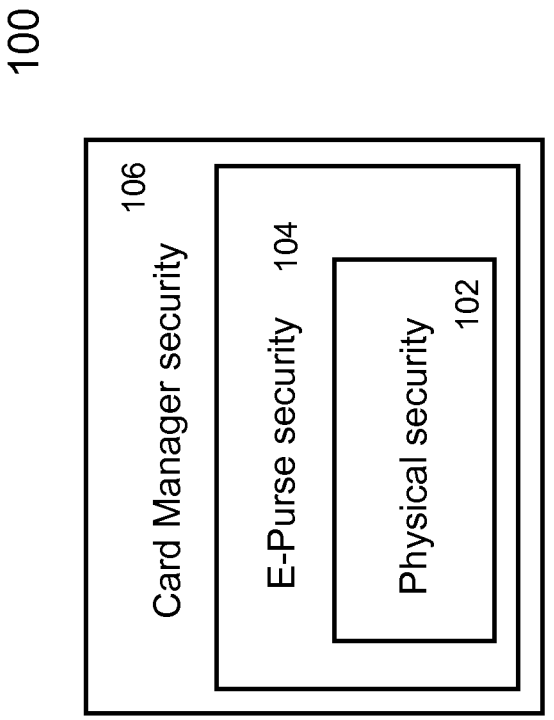

100
106
Card Manager security
104
E-Purse security
102
Physical security

FIG. 1A

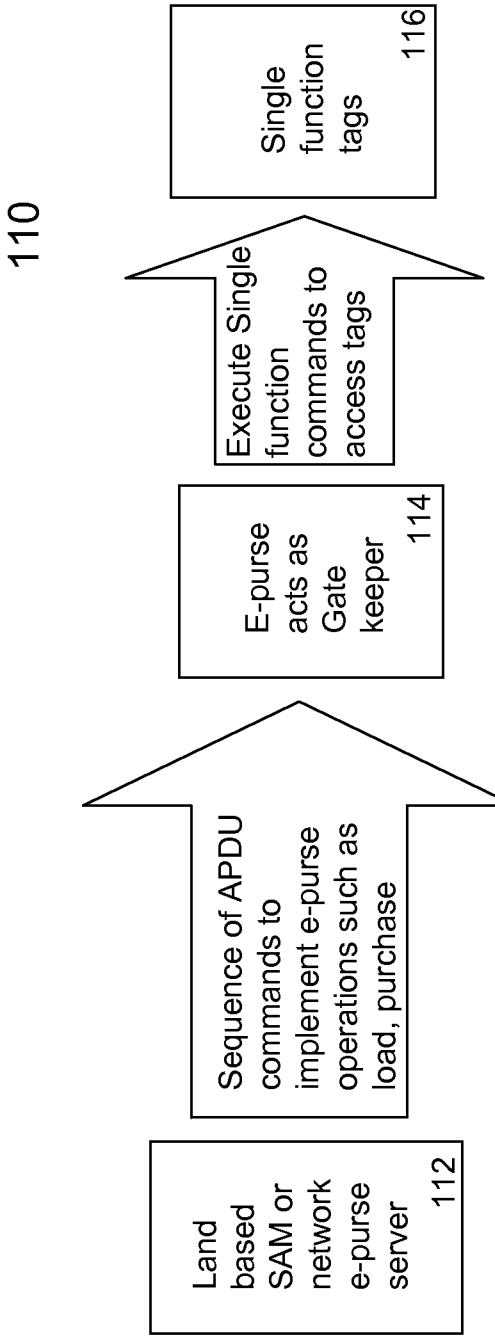

110
Land based SAM or network e-purse server
112
Sequence of APDU commands to implement e-purse operations such as load, purchase
E-purse acts as Gate keeper
114
Execute Single function commands to access tags
Single function tags
116

FIG. 1B

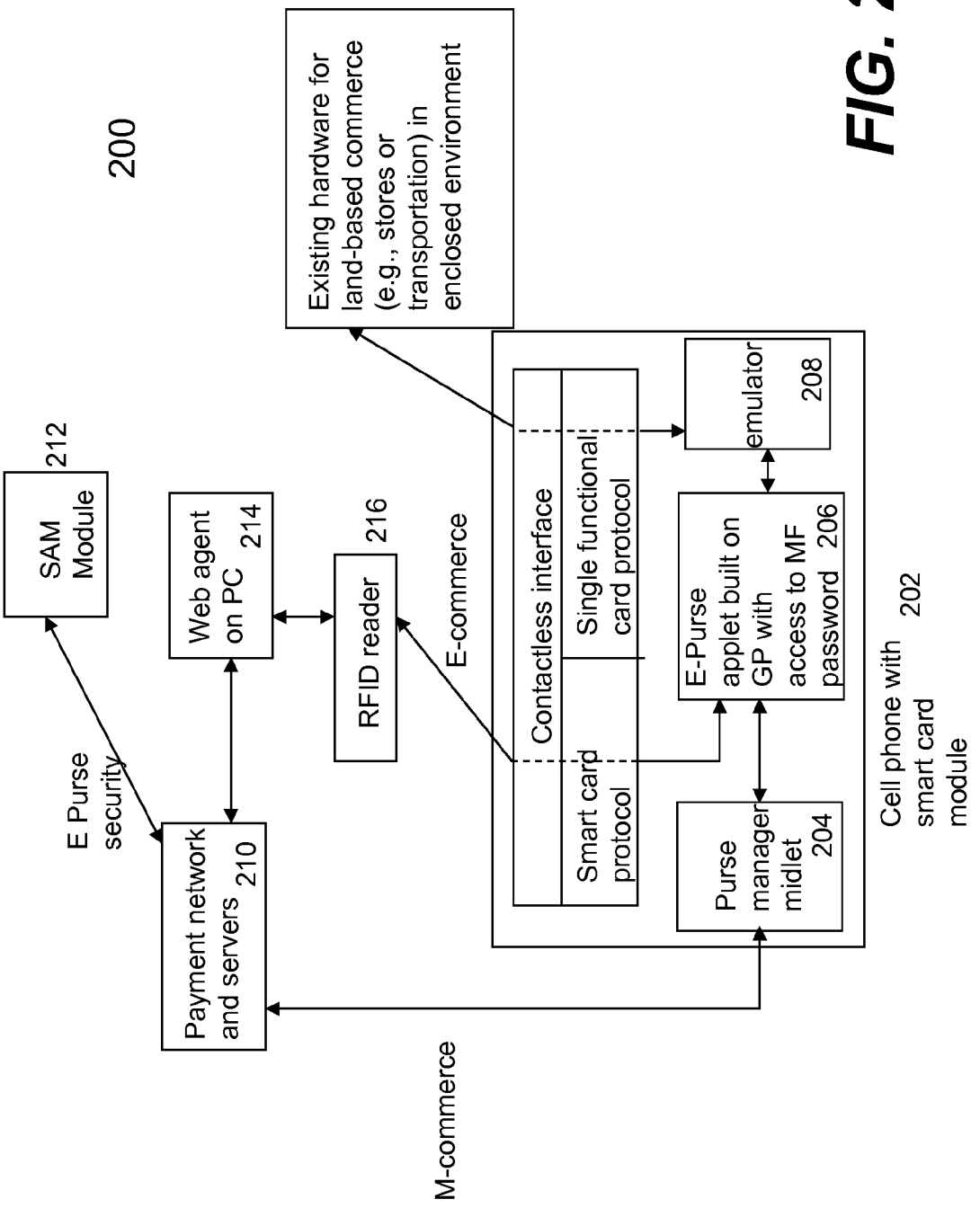

200
Existing hardware for land-based commerce (e.g., stores or transportation) in enclosed environment
SAM Module 212
Web agent on PC 214
RFID reader 216
E-commerce
Contactless interface
Single functional card protocol
emulator 208
Smart card protocol
E-Purse applet built on GP with access to MF password 206
E Purse security
Payment network and servers 210
Purse manager midlet 204
Cell phone with smart card module 202
M-commerce

FIG. 2

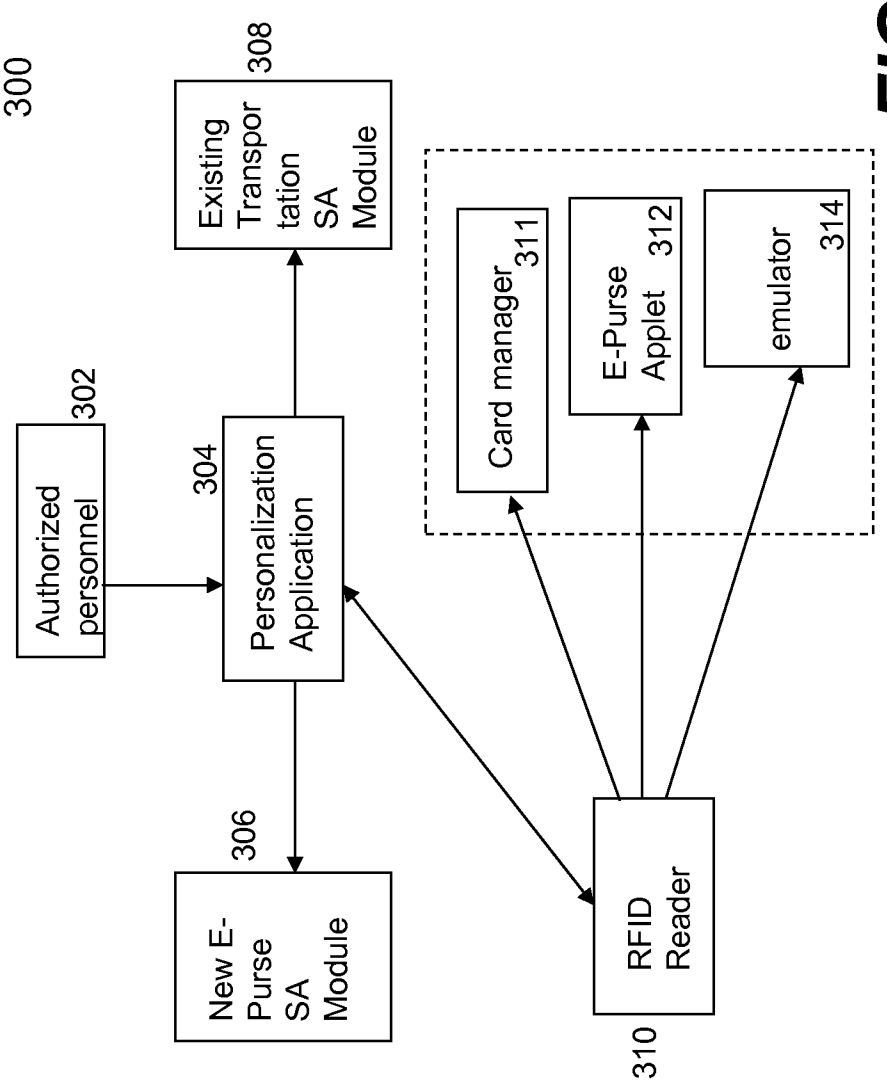

300
Authorized personnel
302
Personalization Application
304
Existing Transportation SA Module
308
New E-Purse SA Module
306
RFID Reader
310
Card manager
311
E-Purse Applet
312
emulator
314

FIG. 3A

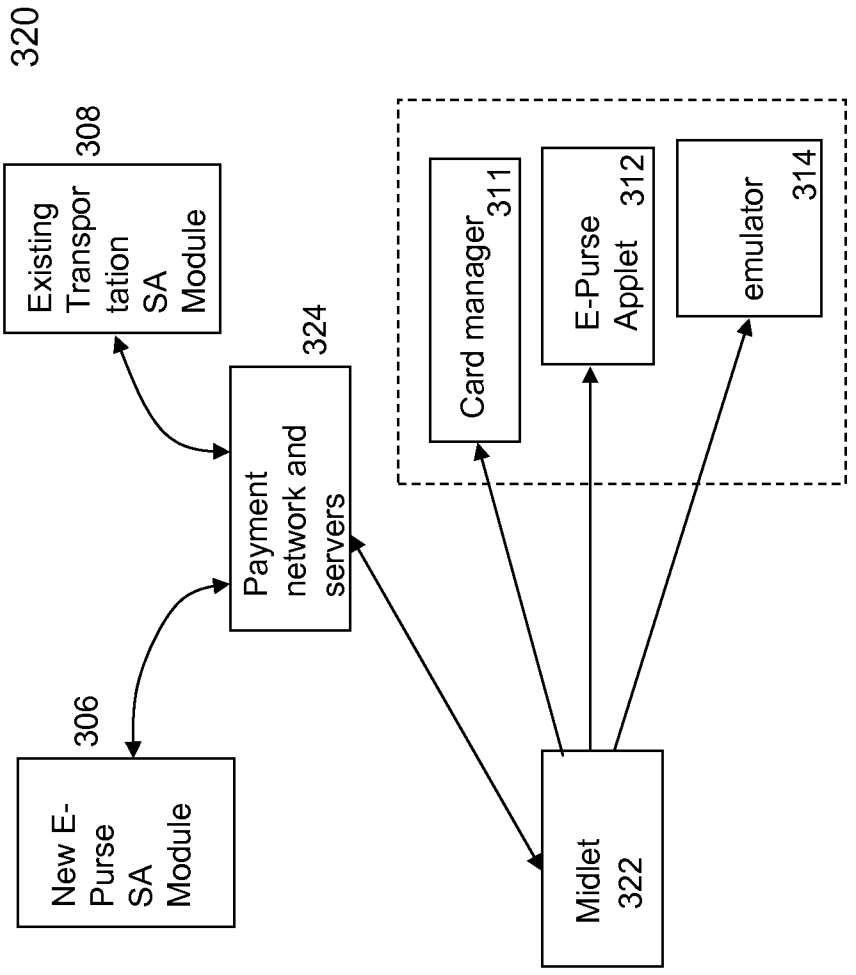

320
Existing Transportation SA Module
308
Payment network and servers
324
New E-Purse SA Module
306
Card manager 311
E-Purse Applet 312
emulator 314
Midlet 322

FIG. 3B

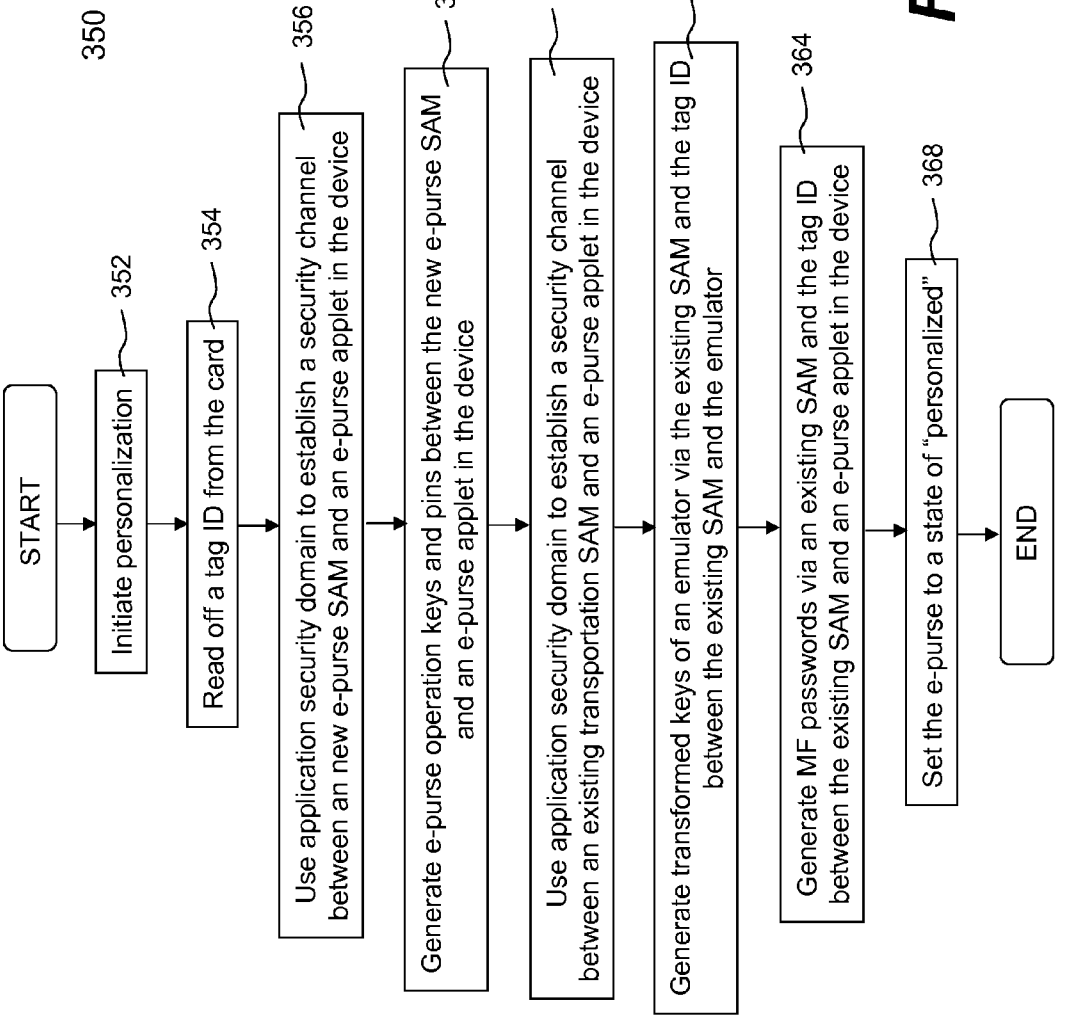

350
START
Initiate personalization
352
Read off a tag ID from the card
354
Use application security domain to establish a security channel between an new e-purse SAM and an e-purse applet in the device
356
Generate e-purse operation keys and pins between the new e-purse SAM and an e-purse applet in the device
358
Use application security domain to establish a security channel between an existing transportation SAM and an e-purse applet in the device
360
Generate transformed keys of an emulator via the existing SAM and the tag ID between the existing SAM and the emulator
362
Generate MF passwords via an existing SAM and the tag ID between the existing SAM and an e-purse applet in the device
364
Set the e-purse to a state of "personalized"
368
END

FIG. 3C

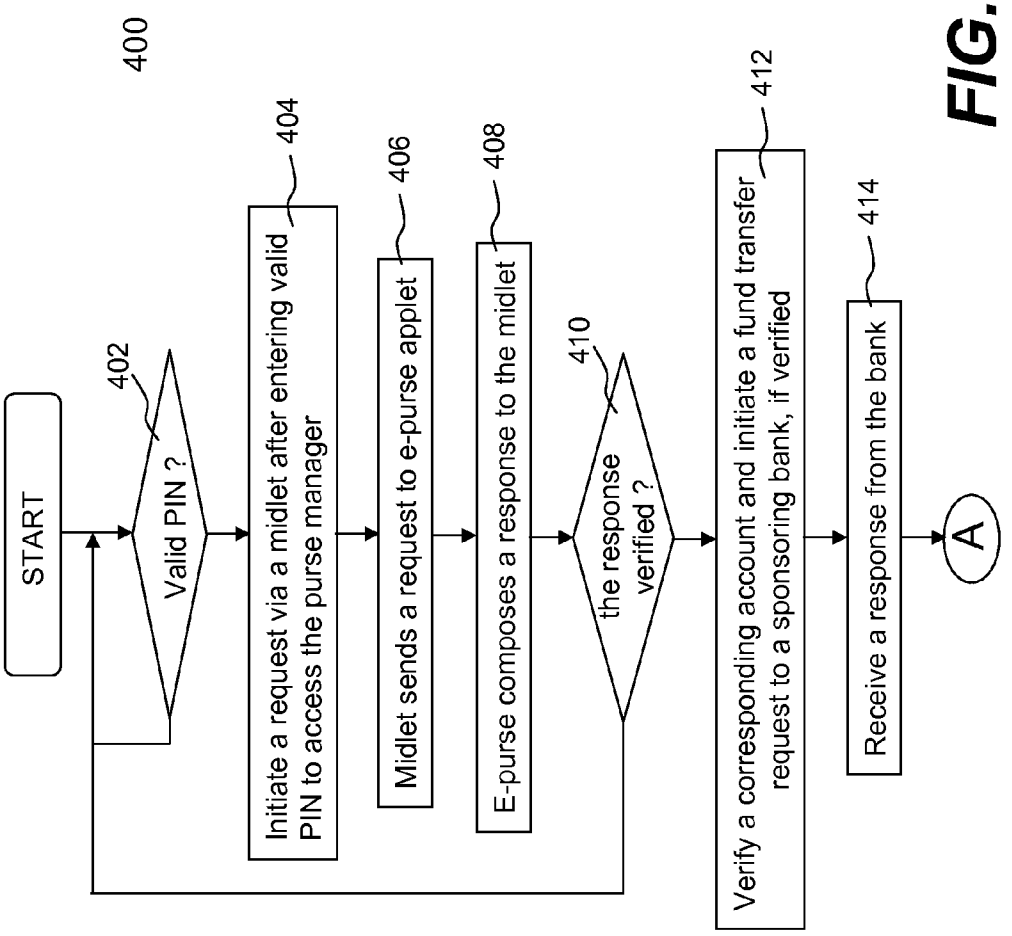

400
START
402
Valid PIN ?
404
Initiate a request via a midlet after entering valid PIN to access the purse manager
406
Midlet sends a request to e-purse applet
408
E-purse composes a response to the midlet
410
the response verified ?
412
Verify a corresponding account and initiate a fund transfer request to a sponsoring bank, if verified
414
Receive a response from the bank
A

FIG. 4A

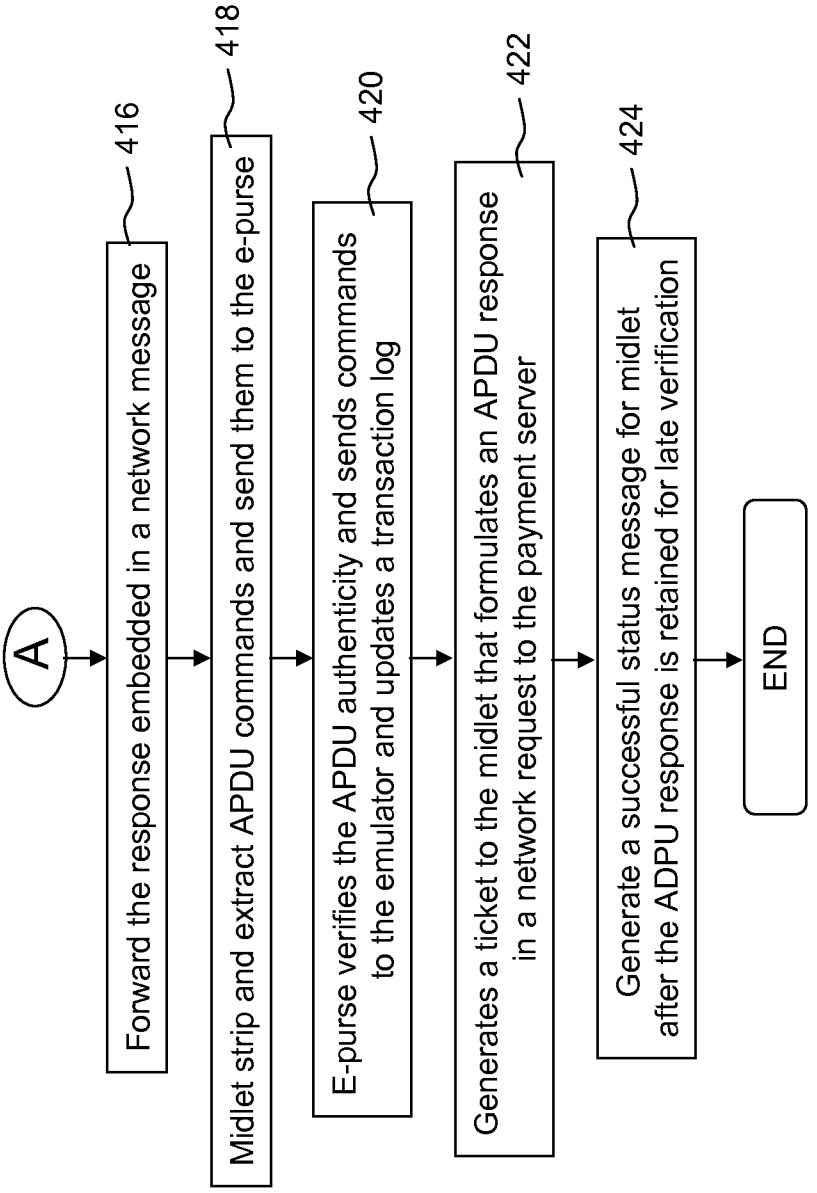

A
Forward the response embedded in a network message
416
Midlet strip and extract APDU commands and send them to the e-purse
418
E-purse verifies the APDU authenticity and sends commands to the emulator and updates a transaction log
420
Generates a ticket to the midlet that formulates an APDU response in a network request to the payment server
422
Generate a successful status message for midlet after the ADPU response is retained for late verification
424
END

FIG. 4B

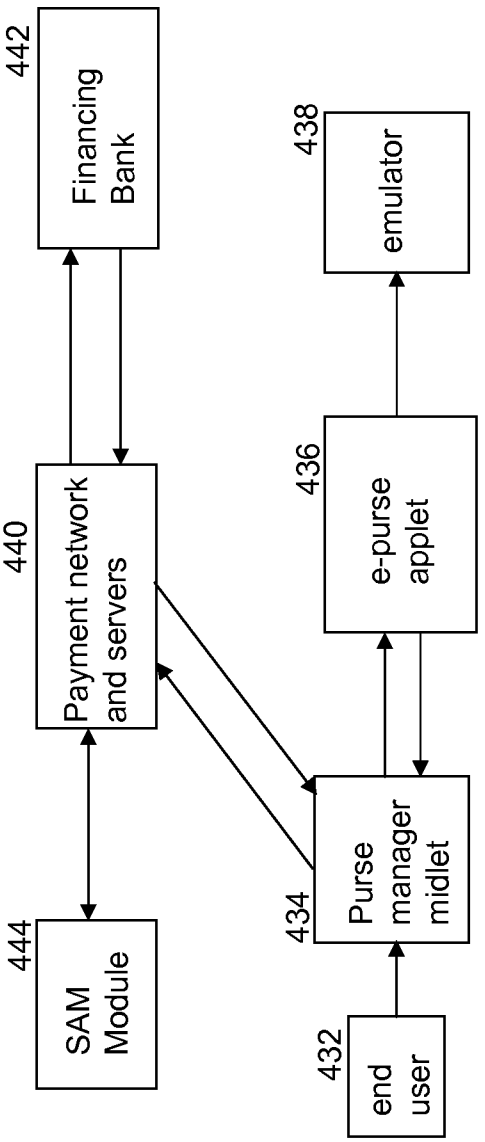

442
Financing Bank
438
emulator
440
Payment network and servers
436
e-purse applet
434
Purse manager midlet
444
SAM Module
432
end user

FIG. 4C

METHOD AND APPARATUS FOR CONDUCTING E-COMMENCE AND M-COMMENCE

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation of U.S. patent application Ser. No. 13/400,038, filed on Feb. 18, 2012, now U.S. Pat. No. 8,448,855, which is a continuation of U.S. patent application Ser. No. 11/534,653, filed on Sep. 24, 2006, now U.S. Pat. No. 8,118,218.

BACKGROUND

1. Technical Field

The present invention is generally related to commerce over networks. Particularly, the present invention is related to electronic purses that can be advantageously used in portable devices configured for both electronic commerce (a.k.a., e-commerce) and mobile commerce (a.k.a., m-commerce).

2. Description of the Related Art

Single functional cards have been successfully used in enclosed environments such as transportation systems. One example of such single functional cards is MIFARE that is the most widely installed contactless smart card technology in the world. With more than 500 million smart card ICs and 5 million reader components sold, MIFARE has been selected as the most successful contactless smart card technology. MIFARE is the perfect solution for applications like loyalty and vending cards, road tolling, city cards, access control and gaming.

It is noticed that such enclosed systems are difficult to be expanded into other areas such as e-commerce and m-commerce because stored values and transaction information are stored in data storage of each tag that is protected by a set of keys. The nature of the tag is that the keys need to be delivered to the card for authentication before data can be accessed during a transaction. This constraint makes systems using such technology difficult to be expanded to an open environment such as the Internet for e-commerce and cellular networks for m-commerce as the key delivery over a public domain network causes security concerns.

There is, thus, a need for a mechanism in devices, especially portable devices, functioning as an electronic purse (e-purse) to be able to conduct transactions over an open network with a payment server without compromising security.

SUMMARY

This section is for the purpose of summarizing some aspects of embodiments of the present invention and to briefly introduce some preferred embodiments. Simplifications or omissions in this section as well as the title and the abstract of this disclosure may be made to avoid obscuring the purpose of the section, the title and the abstract. Such simplifications or omissions are not intended to limit the scope of the present invention.

Broadly speaking, the invention is related to a mechanism provided to devices, especially portable devices, functioning as an electronic purse (e-purse) to be able to conduct transactions over an open network with a payment server without compromising security. According to one aspect of the present invention, a device is loaded with an e-purse manager. The e-purse manager is configured to manage various transactions and functions as a mechanism to access an emulator therein. The transactions may be conducted over a wired network or a wireless network.

According to another aspect of the present invention, a three-tier security model is proposed, based on which the present invention is contemplated to operate. The three-tier security model includes a physical security, an e-purse security and a card manager security, concentrically encapsulating one with another. Security keys (either symmetric or asymmetric) are personalized within the three-tier security model so as to personalize an e-purse and perform secured transaction with a payment server. In one embodiment, the essential data to be personalized into an e-purse include one or more operation keys (e.g., a load key and a purchase key), default PINs, administration keys (e.g., an unblock PIN key and a reload PIN key), and passwords (e.g., from Mifare). During a transaction, the security keys are used to establish a secured channel between an embedded e-purse and an SAM (Security Authentication Module) or backend server.

The invention may be implemented in numerous ways, including a method, system, and device. In one embodiment, the present invention is a method for providing an e-purse, the method comprises providing a portable device embedded with a smart card module pre-loaded with an emulator, the portable device including a memory space loaded with a midlet that is configured to facilitate communication between an e-purse applet therein and a payment server over a wireless network, wherein the portable device further includes a contactless interface that facilitates communication between the e-purse applet therein and the payment server, and personalizing the e-purse applet by reading off data from the smart card to generate one or more operation keys that are subsequently used to establish a secured channel between the e-purse and a SAM or a payment server.

According to another embodiment, the present invention is a system for providing an e-purse, the system comprises a portable device embedded with a smart card module pre-loaded with an emulator, the portable device including a memory space loaded with a midlet that is configured to facilitate wireless communication between an e-purse applet therein and a payment server over a wireless network, the portable device further including a contactless interface that facilitates communication between the e-purse applet therein and the payment server, the payment server associated with an issuer of the e-purse, and a SAM module configured to enable the e-purse, wherein the SAM module is behind the payment server when the e-purse is caused to communicate with the payment server via the midlet over a wireless network (M-commerce in FIG. **2**) or via the agent on a PC over a wired network (E-commerce in FIG. **2**).

Accordingly one of the objects of the present inventions is to provide a mechanism to be embedded in devices, especially portable devices, to function as an electronic purse (e-purse) to be able to conduct transactions over an open network with a payment server without compromising security.

Other objects, features, and advantages of the present invention will become apparent upon examining the following detailed description of an embodiment thereof, taken in conjunction with the attached drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be readily understood by the following detailed description in conjunction with the accompanying drawings, wherein like reference numerals designate like structural elements, and in which:

FIG. **1**A shows a three-tier security model based on which the present invention is contemplated to operate according to one embodiment thereof;

FIG. **1**B shows a data flow in accordance with the three-tier security model among three entities;

FIG. **2** shows an exemplary architecture diagram according to one embodiment of the present invention;

FIG. **3**A a block diagram of related modules interacting with each other to achieve what is referred to herein as e-purse personalization by an authorized person as shown in FIG. **2**;

FIG. **3**B shows a block diagram of related modules interacting with each other to achieve what is referred to herein as e-purse personalization by a user of the e-purse as shown in FIG. **2**;

FIG. **3**C shows a flowchart or process of personalizing an e-purse according to one embodiment of the present invention;

FIG. **4**A and FIG. **4**B show together a flowchart or process of financing an e-purse according to one embodiment of the present invention; and

FIG. **4**C shows an exemplary block diagram of related blocks interacting with each other to achieve the process FIG. **4**A.

DETAILED DESCRIPTION OF THE INVENTION

In the following description, numerous specific details are set forth to provide a thorough understanding of the present invention. The present invention may be practiced without these specific details. The description and representation herein are the means used by those experienced or skilled in the art to effectively convey the substance of their work to others skilled in the art. In other instances, well-known methods, procedures, components, and circuitry have not been described in detail since they are already well understood and to avoid unnecessarily obscuring aspects of the present invention.

Reference herein to "one embodiment" or "an embodiment" means that a particular feature, structure, or characteristic described in connection with the embodiment can be included in at least one implementation of the invention. The appearances of the phrase "in one embodiment" in various places in the specification are not necessarily all referring to the same embodiment, nor are separate or alternative embodiments mutually exclusive of other embodiments. Further, the order of blocks in process, flowcharts or functional diagrams representing one or more embodiments do not inherently indicate any particular order nor imply limitations in the invention.

Embodiments of the present invention are discussed herein with reference to FIGS. **1**A-**4**C. However, those skilled in the art will readily appreciate that the detailed description given herein with respect to these figures is for explanatory purposes only as the invention extends beyond these limited embodiments.

FIG. **1**A shows a three-tier security model **100** based on which the present invention is contemplated to operate according to one embodiment thereof. The three-tier security model **100** includes physical security **102**, e-purse security **104** and card manager security **106**.

Physical security **102** refers to a security mechanism provided by a single functional card to protect data stored on the card. The card may be hardware implemented or software emulated running on a type of media. Data on a single function card is protected by a set of access keys. These keys are configured onto the card when the card is issued. To avoid obscuring aspects of the present invention, the process of how the keys are configured onto the cards is to be omitted. For accessing the data, related keys are delivered to a reader for authentication.

E-purse security **104** defines a set of protocols that enable micro payment transactions to be carried out in both wired and wireless environments. With an electronic purse (a.k.a., e-purse) stored on a smart card, a set of keys (either symmetric or asymmetric) is personalized into the purse when the purse is being issued. During a transaction, the purse uses a set of respective keys for encryption and MAC computation in order to secure the message channel between the purse and the SAM or backend servers. For a single functional card, the e-purse security **104** will act as gates to protect actual operations performed on a single functional card. During personalization, the single functional card access keys (or its transformation) are personalized into the purse with the purse transaction keys.

Card Manager Security **106**, referring to a general security framework of a preload operating system in a smart card, provides a platform for PIN management and security channels (security domains) for card personalization. This platform via a card manager can be used to personalize a purse in one embodiment. One example of the card manager security **106** is what is referred to as a Global Platform (GP) that is a cross-industry membership organization created to advance standards for smart card growth. A GP combines the interests of smart card issuers, vendors, industry groups, public entities and technology companies to define requirements and technology standards for multiple application smart cards. In one embodiment, a global platform security is used to personalize a smart card. As a result, both e-purse keys and card access keys are personalized into the target tag.

FIG. **1**B shows a data flow in accordance with the three-tier security model among three entities a land-based SAM or a network e-purse server **112**, e-purse **114** acting as a gate keeper, and a single function tag **116**. According to one embodiment of the present invention, communications between the land-based SAM or the network e-purse server **112** and the e-purse **114** are conducted in sequence of a type of commands (e.g., APDU) while communications between the e-purse **114** and the single function tag **116** are conducted in sequence of another type of commands, wherein the e-purse **114** acts as the gate keeper to ensure only secured and authorized data transactions could happen.

In reference to FIG. **1**A, the physical security is realized in an emulator. As used herein, an emulator means a hardware device or a program that pretends to be another particular device or program that other components expect to interact with. The e-purse security is realized between one or more applets configured to provide e-purse functioning and a payment server. The card manager security (e.g., global platform security) is realized via a card manager to update security keys to establish appropriate channels for interactions between the server and the applets, wherein the e-purse applet (s) acts as a gatekeeper to regulate or control the data exchange.

According to one embodiment, a smart card has a preloaded smart card operating system that provides security framework to control the access to the smart card (e.g., an installation of external applications into the smart card). In order to manage the life cycle of an external application, a card manager module is configured by using the smart card security framework. For instance, a Java-based smart card, SmartMX, is preloaded with an operating system JCOP 4.1. The Global Platform 2.1 installed on the SmartMX performs the card manager functionality.

Referring now to FIG. **2**, there shows an exemplary architecture diagram **200** according to one embodiment of the present invention. The diagram **200** includes a cellphone **202** embedded with a smart card module. An example of such a cell phone is a near field communication (NFC) enabled cellphone that includes a Smart MX (SMX) module. The SMX is pre-loaded with a Mifare emulator **208** (which is a single functional card) for storing values. The cellphone is equipped with a RFID interface (e.g., ISO 144443) that allows the cellphone to act as a tag. In addition, the SMX is a JavaCard that can run Java applets. According to one embodiment, an e-purse is built on top of the global platform and implemented as an applet in SMX. The e-purse is configured to be able to access the Mifare data structures with appropriate transformed passwords based on the access keys.

In the cellphone **202**, a purse manager midlet **204** is provided. For M-commerce, the midlet **204** acts as an agent to facilitate communications between an e-purse applet **206** and one or more payment network and servers **210** to conduct transactions therebetween. As used herein, a midlet is a software component suitable for being executed on a portable device. The purse manager midlet **204** is implemented as a "midlet" on a Java cellphone, or an "executable application" on a PDA device. One of the functions this software component provides is to connect to a wireless network and communicate with an e-purse applet which can reside on either the same device or an external smart card. In addition, it is configured to provide administrative functions such as changing a PIN, viewing a purse balance and a history log. In one application in which a card issuer provides an SA module **212** that is used to enable and authenticate any transactions between a card and a corresponding server (also referred to as a payment server). As shown in FIG. **2**, APDU commands are constructed by the servers **210** having access to an SA module **212**, where the APDU stands for Application Protocol Data Unit that is a communication unit between a reader and a card. The structure of an APDU is defined by the ISO 7816 standards. Typically, an APDU command is embedded in network messages and delivered to the server **210** or the e-purse applet **206** for processing.

For e-commerce, a web agent **214** on a computing device (not shown) is responsible for interacting with a RFID reader and the network server **210**. In operation, the agent **214** sends the APDU commands or receives responses thereto through the RFID reader **216** to/from the e-purse applet **206** residing in the cellphone **202**. On the other hand, the agent **214** composes network requests (e.g., an HTTP request) and receives responses thereto from the payment server **210**.

To personalize the cellphone **202**, FIG. **3**A shows a block diagram **300** of related modules interacting with each other to achieve what is referred to herein as e-purse personalization by an authorized person as shown in FIG. **2**. FIG. **3**B shows a block diagram **320** of related modules interacting with each other to achieve what is referred to herein as e-purse personalization by a user of the e-purse as shown in FIG. **2**.

FIG. **3**C shows a flowchart or process **350** of personalizing an e-purse according to one embodiment of the present invention. FIG. **3**C is suggested to be understood in conjunction with FIG. **3**A and FIG. **3**B. The process **350** may be implemented in software, hardware or a combination of both.

As described above, an e-purse is built on top of a global platform to provide a security mechanism necessary to personalize applets designed therefor. In operation, a security domain is used for establishing a secured channel between a personalization application and the e-purse. According to one embodiment, the essential data to be personalized into the purse include one or more operation keys (e.g., a load key and a purchase key), default PINs, administration keys (e.g., an unblock PIN key and a reload PIN key), and passwords (e.g., from Mifare).

It is assumed that a user desires to personalize an e-purse embedded in a device (e.g., a cellphone). At **352** of FIG. **3**C, a personalization process is initiated. Depending on implementation, the personalization process may be implemented in a module in the device and activated manually or automatically, or a physical process initiated by an authorized person (typically associated with a care issuer). As shown in FIG. **3**A, an authorized personal initiates a personalization process **304** to personalize the e-purse for a user thereof via an existing new e-purse SA module **306** and a SA module **308** with the RFID reader **310** as the interface. The card manager **311** performs at least two functions: 1. establishing a security channel, via a security domain, to install and personalize an external application (e.g., e-purse applet) in the card personalization; and 2. creating security means (e.g., PINs) to protect the application during subsequent operations. As a result of the personalization process **304**, the e-purse applet **312** and the emulator **314** are personalized.

Similarly, as shown in FIG. **3**B, a user of an e-purse desires to initiate a personalization process to personalize the e-purse wirelessly (e.g., via the m-commerce path of FIG. **2**). Different from FIG. **3**A, FIG. **3**B allows the personalization process to be activated manually or automatically. For example, there is a mechanism on a cellphone that, if pressed, activates the personalization process. Alternatively, a status of "non-personalized" may prompt to the user to start the personalization process. As described above, a midlet **322** in a device acts as an agent to facilitate the communication between a payment server **324** and the e-purse **312** as well as the emulator **314**, wherein the payment server **324** has the access to the existing new e-purse SA module **306** and an SA module **308**. As a result of the personalization process, the e-purse applet **312** and the emulator **314** are personalized.

Referring now back to FIG. **3**C, after the personalization process is started, in view of FIG. **3**A, the RFID reader **310** is activated to read the tag ID and essential data from a card in the device at **354**. With an application security domain (e.g., a default security setting by a card issuer), a security channel is then established at **356** between a new e-purse SAM (e.g., the SAM **306** of FIG. **3**A) and an e-purse applet (e.g., the e-purse applet **312** of FIG. **3**A) in the device.

Each application security domain of a global platform includes three 3DES keys. For example:

Key1: 255/1/DES-ECB/ 404142434445464748494a4b4c4d4e4f

Key2: 255/2/DES-ECB/ 404142434445464748494a4b4c4d4e4f

Key3: 255/3/DES-ECB/ 404142434445464748494a4b4c4d4e4f

A security domain is used to generate session keys for a secured session between two entities, such as the card manager applet and a host application, in which case the host application may be either a desktop personalization application or a networked personalization service provided by a backend server.

A default application domain can be installed by a card issuer and assigned to various application/service providers. The respective application owner can change the value of the key sets before the personalization process (or at the initial of the process). Then the application can use the new set to create a security channel for performing the personalization process.

With the security channel is established using the application provider's application security domain, the first set of

data can be personalized to the purse applet. The second set of data can also be personalized with the same channel, too. However, if the data are in separate SAM, then a new security channel with the same key set (or different key sets) can be used to personalize the second set of data.

Via the new purse SAM **306**, a set of e-purse operation keys and pins are generated for data transactions between the new e-purse SAM and the e-purse applet to essentially personalize the e-purse applet at **358**.

A second security channel is then established at **360** between an existing SAM (e.g., the SAM **308** of FIG. **3**A) and the e-purse applet (e.g., the e-purse applet **312** of FIG. **3**A) in the device. At **362**, a set of transformed keys is generated using the existing SAM and the tag ID. The generated keys are stored in the emulator for subsequent data access authentication. At **358**, a set of MF passwords is generated using the existing SAM and the tag ID, then is stored into the e-purse applet for future data access authentication. After it is done, the e-purse including the e-purse applet and the corresponding emulator is set to a state of "personalized".

FIG. **4**A and FIG. **4**B show together a flowchart or process **400** of financing an e-purse according to one embodiment of the present invention. The process **400** is conducted via the m-commerce path of FIG. **2**. To better understand the process **400**, FIG. **4**C shows an exemplary block diagram **450** of related blocks interacting with each other to achieve the process **400**. Depending on an actual application of the present invention, the process **400** may be implemented in software, hardware or a combination of both.

A user is assumed to have obtained a portable device (e.g., a cellphone) that is configured to include an e-purse. The user desires to fund the e-purse from an account associated with a bank. At **402**, the user enters a set of personal identification numbers (PIN). Assuming the PIN is valid, a purse manger in the device is activated and initiates a request (also referred to an OTA top off request) at **404**. The midlet in the device sends a request to the e-purse applet at **406**, which is illustrated in FIG. **4**C where the e-purse manager midlet **434** communicates with the e-purse applet **436**.

At **408**, the e-purse applet composes a response in responding to the request from the midlet. Upon receiving the response, the midlet sends the response to a payment network and server over a wireless network. As shown in FIG. **4**C, the e-purse manager midlet **434** communicates with the e-purse applet **436** for a response that is then sent to the payment network and server **440**. At **410**, the process **400** needs to verify the validity of the response. If the response can not be verified, the process **400** stops. If the response can be verified, the process **400** moves to **412** where a corresponding account at a bank is verified. If the account does exist, a fund transfer request is initiated. At **414**, the bank receives the request and responds to the request by returning a response. In general, the messages exchanged between the payment network and server and the bank are compliant with a network protocol (e.g., HTTP for the Internet).

At **416**, the response from the bank is transported to the payment network and server. The midlet strips and extracts the APDU commands from the response and forwards the commands the e-purse at **418**. The e-purse verifies the commands at **420** and, provided they are authorized, send the commands to the emulator at **420** and, meanwhile updating a transaction log. At **422**, a ticket is generated to formulate a response (e.g., in APDU format) for payment server. As a result, the payment server is updated with a successful status message for the midlet, where the APDU response is retained for subsequent verification at **424**.

As shown in FIG. **4**C, the payment network and server **440** receives a response from the purse manager midlet **434** and verifies that the response is from an authorized e-purse originally issued therefrom with a SAM module **444**. After the response is verified, the payment network and server **440** sends a request to the financing bank **442** with which the user **432** is assumed to maintain an account. The bank will verify the request, authorize the request and return an authorization number in some pre-arranged message format. Upon receiving the response from bank, the server **440** will either reject the request or form a network response to be sent to the midlet **434**.

The e-purse verifies the authenticity (e.g., in APDU format) and sends commands to the emulator **438** and updates the transaction logs. By now, the e-purse finishes the necessary steps and returns a response to the midlet **434** that forwards an (APDU) response in a network request to the payment server **440**.

Although the process **400** is described as funding the e-purse. Those skilled in the art can appreciate that the process of making purchasing over a network with the e-purse is substantially similar to the process **400**, accordingly no separate discussion on the process of making purchasing is provided.

The invention is preferably implemented by software, but can also be implemented in hardware or a combination of hardware and software. The invention can also be embodied as computer readable code on a computer readable medium. The computer readable medium is any data storage device that can store data which can thereafter be read by a computer system. Examples of the computer readable medium include read-only memory, random-access memory, CD-ROMs, DVDs, magnetic tape, optical data storage devices, and carrier waves. The computer readable medium can also be distributed over network-coupled computer systems so that the computer readable code is stored and executed in a distributed fashion.

The present invention has been described in sufficient details with a certain degree of particularity. It is understood to those skilled in the art that the present disclosure of embodiments has been made by way of examples only and that numerous changes in the arrangement and combination of parts may be resorted without departing from the spirit and scope of the invention as claimed. Accordingly, the scope of the present invention is defined by the appended claims rather than the foregoing description of embodiment.

We claim:

1. A portable device for commerce, the portable device comprising:

an emulator loaded in a smart card module for storing security values and updated transaction logs, and an e-purse applet to cause the portable device to function as an electronic purse (e-purse), wherein both of the emulator and e-purse applet are already personalized via a personalization process built on a first security channel so that the emulator is set to store a set of keys for subsequent data access authentication and the e-purse applet is configured to conduct a transaction with a network server over a second security channel;

a first interface configured to perform field communication (NFC) with a reader to perform electronic commerce with the e-purse applet against a fund stored in the emulator;

a second interface configured to perform mobile commerce with a payment server via an application against the fund stored in the emulator; and

a purse manager midlet being executed in the portable device to act as an agent to facilitate communications between the e-purse applet and a payment server to conduct transactions therebetween.

2. The portable device as recited in claim **1**, further comprising a security module configured to install and personalize the e-purse applet via either the first interface or the second interface, wherein the keys are updated when the personalization process built on the first security channel completes.

3. The portable device as recited in claim **1**, wherein the e-purse is built on top of a global platform to be able to access MIFARE data structures with an appropriate transformed password based on the keys in the emulator, wherein the global platform is a cross-industry membership organization created to advance standards for smart card growth.

4. The portable device as recited in claim **1**, wherein the first interface is based on a RFID interface that allows the portable device to act as a tag to be read off by the reader connected to a computing device coupled to the Internet.

5. The portable device as recited in claim **4**, wherein a web agent on the computing device is configured to interact with the RFID reader and the network server, the agent sends commands or receives responses thereto through the RFID reader to/from the e-purse applet, and on the other hand, the agent composes network requests and receives responses thereto from the network server.

6. The portable device as recited in claim **1**, wherein

the first security channel is an initial security channel between the smart card module and a security authentication module (SAM) external to the smart card module to install and personalize the e-purse applet, and

the second security channel is a security channel on top of the initial security channel to protect subsequent operations of the smart card module with the SAM, wherein any subsequent operation is conducted over the security channel via the e-purse applet.

7. The portable device as recited in claim **6**, wherein essential data being personalized include one or more operation keys, default PINs, administration keys and passwords.

8. The portable device as recited in claim **1**, wherein the smart card module is part of the portable device.

9. The portable device as recited in claim **1**, wherein the smart card module is an external device inserted into the portable device.

10. The portable device as recited in claim **1**, wherein the purse manager midlet is configured to access the emulator directly.

11. A method for a portable device for commerce, the method comprising:

loading a smart card module with an emulator for storing security values and updated transaction logs, and an e-purse applet to cause the portable device to function as an electronic purse (e-purse);

personalizing the emulator and the e-purse applet via a personalization process built on a first security channel so that the emulator is set to store a set of keys for subsequent data access authentication and the e-purse applet is configured to conduct a transaction with a network server over a second security channel;

performing near field communication (NFC) via a first interface with a reader to perform electronic commerce with the e-purse applet against a fund stored in the emulator; and

performing mobile commerce via a second interface with a payment server via an application against the fund stored in the emulator, wherein the application is executed in the portable device to act as an agent to facilitate communications between the e-purse applet and a payment server to conduct transactions therebetween.

12. The method as recited in claim **11**, wherein a security module in the portable device is configured to install and personalize the e-purse applet via either the first interface or the second interface, wherein the keys are updated when the personalization process built on the first security channel completes.

13. The method as recited in claim **11**, wherein the e-purse is built on top of a global platform to be able to access MIFARE data structures with an appropriate transformed password based on the keys in the emulator, wherein the global platform is a cross-industry membership organization created to advance standards for smart card growth.

14. The method as recited in claim **11**, wherein the first interface is based on a RFID interface that allows the portable device to act as a tag to be read off by the reader connected to a computing device coupled to the Internet.

15. The method as recited in claim **14**, wherein a web agent on the computing device is configured to interact with the RFID reader and the network server, the agent sends commands or receives responses thereto through the RFID reader to/from the e-purse applet, and on the other hand, the agent composes network requests and receives responses thereto from the network server.

16. The method as recited in claim **11**, wherein said personalizing of the emulator and the e-purse applet comprises:

establishing an initial security channel between the smart card module and a security authentication module (SAM) external to the smart card module to install and personalize the e-purse applet in the card module, and

creating a security channel on top of the initial security channel to protect subsequent operations of the smart card module with the SAM, wherein any subsequent operation is conducted over the security channel via the e-purse applet.

17. The method as recited in claim **16**, wherein essential data being personalized include one or more operation keys, default PINs, administration keys and passwords.

18. The method as recited in claim **11**, wherein the smart card module is part of the portable device.

19. The method as recited in claim **11**, wherein the smart card module is an external device inserted into the portable device.

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