

MOBILE CARD PAYMENT SYSTEM

BACKGROUND OF THE INVENTION

This application claims the priority of Korean Patent Application No. 2005-91733, filed on September 30, 2005, in the Korean Intellectual Property Office, the disclosure of which is incorporated herein in its entirety by reference.

1. Field of the Invention

The present invention relates to an electronic commerce system and, more particularly, to a mobile card payment system which allows a customer to pay charges with a card through his/her own mobile phone and allows the customer to conveniently select or change mobile card payment service providers.

2. Description of Related Art

Recently, as customers pay charges with their cards instead of cash, service providers are increasingly provided with card payment equipment. However, there is a problem in that it is not convenient for salesmen to sell products in such places as households or markets which are not provided with the card payment equipment.

In order to solve the above-mentioned problem, there have been proposed techniques of allowing customers to pay charges with their cards through salesmen's mobile phones. The techniques are as follows:

(1) There has been proposed a card payment service system in which after a customer makes a call to a payment gateway, the customer provides his/her own credit card information according to ARS instructions of the payment gateway, receives an authorization number through his/her mobile phone, and makes a payment. However, there is a problem in this method in that it is not convenient to use the method and the credit card information may be revealed.

(2) There has been provided a terminal only for mobile card payment services which is manufactured and released by a mobile carrier cooperating with a VAN service provider. However, there is a problem in that customers need to purchase the terminal for the mobile card payment services and to change an existing card payment authorization agent to a different one.

SUMMARY OF THE INVENTION

The present invention provides a mobile card payment system which allows a customer to pay charges

with a card through his/her own mobile phone and allows the customer to conveniently select or change mobile card payment service providers.

According to an aspect of the present invention, there is provided a mobile card payment system including a mobile card payment service gateway that is connected to a mobile card payment terminal over a wireless network and is connected to a payment authorization request server over a leased line or Internet, in which the mobile card payment terminal includes: a wireless communication unit that transmits/receives data to/from a wireless network through an antenna; a key input unit that allows a user to enter commands and data; a display unit that displays menus and operating conditions; a storage unit that stores a mobile card payment program and membership identification information; and a mobile card payment processing unit that, when a command to select a mobile card payment menu is input from the key input unit, generates and transmits a mobile card payment request message, which includes payment information inputted from the key input unit and the membership identification information stored in the storage unit, to the mobile card payment service gateway through the wireless communication unit under

the control of the mobile card payment program stored in the storage unit, in which the mobile card payment service gateway includes: a membership database that stores membership identification information, payment authorization request server access information corresponding to the membership identification information, and mobile card payment terminal identification information of each payment authorization request server corresponding to the membership identification information; and a payment service processing unit that, when a mobile card payment request message including the payment information and the membership identification information is input from the mobile card payment terminal, refers to the membership database using the membership identification information to retrieve the payment authorization request server access information and the terminal identification information, generates and transmits a payment authorization request message, which includes the payment information and the terminal identification information, to a corresponding payment authorization request server after the payment authorization request server access information and the terminal identification information is retrieved, and receives

and transmits the payment authorization information to the mobile card payment terminal.

The mobile card payment terminal may further include an authentication processing unit that transmits terminal authentication information including mobile phone subscriber information to the mobile card payment service gateway, receives and stores membership identification information in the storage unit, and the mobile card payment service gateway may further include a membership identification information processing unit that, when the terminal authentication information including the mobile phone subscriber information is input from the mobile card payment terminal, inquires of a mobile phone subscriber information management server whether or not the registered mobile phone subscriber information is valid, and, if valid, generates and transmits the membership identification information to the mobile card payment terminal.

When the mobile card payment terminal identification information and the membership identification information are input from the mobile card payment terminal, the membership identification information processing unit may refer to the membership database using the terminal identification

information to retrieve a database list in which the terminal identification information is stored, and store the membership identification information in the retrieved database list.

The mobile phone subscriber information may include a mobile phone number and at least part of residence registration number.

The mobile card payment terminal may further include a chip interface that interfaces with an external chip card including mobile phone subscriber information, and the mobile card payment processing unit may generate the mobile card payment request message using the mobile phone subscriber information stored in the chip card.

The mobile card payment terminal may further include: a communication unit that transmits/receives data to/from a mobile card reader or a receipt printer; and a payment authorization information output unit that outputs the payment authorization information inputted from the mobile card payment processing unit to the receipt printer through the communication unit.

The communication unit may be a short-range wireless communication unit.

The payment information inputted from the key

input unit may include a card number, the term of validity, the amount of payment, and installment information.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other features and advantages of the present invention will become more apparent by describing in detail exemplary embodiments thereof with reference to the attached drawings in which:

FIG. 1 is a block diagram of a mobile card payment system according to an embodiment of the present invention;

FIG. 2 is a block diagram of a mobile card payment terminal according to an embodiment of the present invention;

FIG. 3 is a block diagram of a mobile card payment service gateway according to an embodiment of the present invention;

FIG. 4 is a flow chart of a mobile card payment service according to an embodiment of the present invention; and

FIG. 5 is a flow chart of a membership authentication process for a mobile card payment service.

DETAILED DESCRIPTION OF THE INVENTION

Exemplary embodiments in accordance with the present invention will now be described in detail with reference to the accompanying drawings.

FIG. 1 is a block diagram of a mobile card payment system according to an embodiment of the present invention.

The mobile card payment system includes a card 10, a mobile card payment terminal 100, a mobile phone subscriber information management server 200 that is connected to the mobile card payment terminal 100 over a wireless network, a mobile card payment service gateway 300, a payment authorization request server 400 that is connected to the mobile card payment service gateway 300 over Internet and a leased line, a payment authorization server 500, a mobile card reader 600, and a receipt printer 700.

The card 10 is made available instead of cash and issued by banks or card issuers. Examples of the card 10 include credit cards, debit cards, prepaid cards and the like. Normally, the card 10 is equipped with a magnetic or IC chip having card information, such as a card number and the term of validity.

The mobile card payment terminal 100 transmits a mobile card payment request message including payment

information and membership identification information to the mobile card payment service gateway 300 through wireless data communication, and receives payment authorization information in return. The mobile card payment terminal 100 may be a mobile phone.

The mobile phone subscriber information management server 200 stores and manages subscriber information for call processing, and provides the subscriber information to other systems requiring this information. Further, the mobile phone subscriber information management server 200 manages information, which is required to offer communication services to subscribers, such as information concerning value added services of subscriber, and provides the information to other systems requiring this information. The mobile phone subscriber information management server 200 may be a home location register (HLR).

The mobile card payment service gateway 300 manages membership identification information, payment authorization request server access information, and mobile card payment terminal identification information of each payment authorization request server. When the mobile card payment service gateway 300 receives a mobile card payment request message

including payment information and membership identification information from the mobile card payment terminal 100, it retrieves payment authorization request server access information and terminal identification information which correspond to the membership identification information. After the payment authorization request server access information and the terminal identification information are retrieved, the mobile card payment service gateway 300 generates and transmits a mobile authorization request message, which includes the retrieved terminal identification information and the payment information inputted from the mobile card payment terminal 100, to the corresponding payment authorization request server 400. In addition, the mobile card payment service gateway 300 receives payment authorization information from the payment authorization request server 400 and transmits it to the mobile card payment terminal 100.

The payment authorization request server 400 secures credit information on a card owner in electronic commerce, and transmits a card payment authorization request and a response to the request to the mobile card payment service gateway 300. The payment authorization request server 400 may be a

payment gateway of an electronic payment agent or a server of a VAN service provider.

The payment authorization server 500 stores and manages the card information and the terminal identification information. In addition, when the payment authorization server 500 receives a card payment authorization request including the payment information and the terminal identification information, it processes card payment authentication based on the payment information and the terminal identification information, and transmits the results to a device that has requested the card payment authorization. The payment authorization server 500 may be a server of a credit card issuer or a bank having issued the card.

The mobile card reader 600 reads card information. The mobile card reader 600 may transmit the card information to a mobile phone through a serial communication, such as RS-232C or USB, or a short-range wireless communication, such as Bluetooth or infrared communication. The mobile card reader 600 may be configured to use electric power supplied from a power supply of the mobile phone.

The receipt printer 700 receives card payment authorization information from the mobile card payment

terminal 100 and prints card payment authorization information on a paper. The receipt printer 700 may be configured to interface through a serial communication, such as RS-232C or USB, or a short-range wireless communication, such as Bluetooth or infrared communication. In addition, the receipt printer 700 may have a card reader function.

FIG. 2 is a block diagram of a mobile card payment terminal according to an embodiment of the present invention. The mobile card payment terminal includes a wireless communication unit 110, a voice input/output unit 120, a key input unit 130, a storage unit 140, a display unit 150, a communication unit 160, and a controller 170.

The wireless communication unit 110 transmits/receives data to/from a wireless network over an antenna. The wireless communication unit 110 may include an antenna and a radio frequency (RF) circuit for communication with a mobile communication base station. The wireless communication unit 110 is construed to comprehend existing mobile communication systems, such as CDMA, cellular, GSM, and W-CDMA, as well as future mobile communication systems.

The voice input/output unit 120 receives digital voice data from the wireless communication unit 110,

converts the digital voice data to an analog voice signal, and outputs the analog voice signal to a speaker (not shown). The voice input/output unit 120 receives an analog voice signal from a microphone (not shown), and converts the analog voice signal to a digital voice signal. The voice input/output unit 120 may include well-known additional circuits, such as an audio amplifier or a filter.

The key input unit 130 allows a user to input instructions and data. The key input unit 130 may be a keypad, a sidekey, a touch panel, a handwriting input unit, a voice recognition unit, or the like. The display unit 150, which is normally a liquid crystal display (LCD) device, displays operating conditions of the terminal, menu screens, call processing screens, and the like.

The storage unit 140 stores execution programs and related data. The storage unit 140 may be a single chip including an SRMA (static random access memory) with a capacity of several megabits and a flash memory with a capacity of tens megabits.

The communication unit 160 transmits/receives data to/from external devices, such as a mobile phone, a mobile card reader, a receipt printer, or the like. The communication unit 160 may be a USB or RS-232C

serial communication device, or a short-range wireless communication device using Bluetooth, infrared communication, or ZigBee.

The controller 170 controls the entire system, and may include hardware dedicated for communication processing, a digital signal processor, and a general-purpose microprocessor. According to an embodiment of the present invention, the controller 170 includes a communication processing unit 171, a mobile card payment processing unit 173, an authentication processing unit 175, and a payment authorization information output unit 176.

The communication processing unit 171 transmits/receives data over Internet. The communication processing unit 171 may further include a voice communication processing unit for restoring a voice signal from a wireless signal transmitted/received through the wireless communication unit 110.

When the mobile card payment processing unit 173 receives a command to select a mobile card payment menu from the key input unit 130, it generates a mobile card payment request message, which includes the payment information from the key input unit and the membership identification information stored in

the storage unit 140, under the control of a mobile card payment program stored in the storage unit 140. The payment information may include a card number, the term of validity, the amount of payment, and installment information. The mobile card payment processing unit 173 transmits the generated mobile card payment request message to the mobile card payment service gateway 300 through the wireless communication unit 110, and receives payment authorization information in response to the message. The payment authorization information may include purchase information concerning franchise store ID, card issuer name, authorization number, date of transaction, card number, and the like.

The authentication processing unit 175 transmits terminal authentication information including mobile phone subscriber information to the mobile card payment service gateway 300, receives and stores membership identification information in the storage unit 140. The payment authorization information output unit 176 outputs the payment authorization information inputted from the mobile card payment processing unit 171 to the receipt printer 700 through the communication unit 160.

According to another embodiment of the present

invention, the mobile card payment terminal may further include a chip interface and a chip card 185. The chip interface 180 is configured to receive the chip card 185 and is normally provided between a batter pack and a main body. The chip interface 180 interfaces with the chip card 185 through serial communication. The chip card 185 may store mobile phone subscriber information, such as telephone number, parameters related to an authentication algorithm, PIN (personal identity number) code, and the like. The chip card 185 may be typically a SIM (subscriber identity module) card.

The mobile card payment processing unit 171 generates the mobile card payment request message using the mobile phone subscriber information stored in the chip card 185. The mobile card payment processing unit 171 may record the payment authorization information transmitted to the mobile card payment service gateway 300 on the chip card 185.

FIG. 3 is a block diagram of a mobile card payment service gateway according to an embodiment of the present invention. The mobile card payment service gateway includes a communication unit 320, which transmits/receives data to/from external devices, a memory 340, and a gateway controller 360.

The memory 340 stores execution programs and related data. The memory 340 may be a high-capacity hard disk drive or a flash memory. The memory 340 preferably includes a membership database 341 for storing membership identification information, payment authorization request server access information, and mobile card payment terminal identification information of each payment authorization request server. The payment authorization request server access information and the mobile card payment terminal identification information of each payment authorization request server may be registered in the membership database 341 when a customer applies for admission to membership through a phone call or by fax transfer to an operator of the mobile card payment service gateway. The membership identification information may be generated and registered in the membership database 341 during a membership authentication process in the mobile card payment terminal owned by the customer.

The gateway controller 360 is preferably a microprocessor in which ROM, RAM, and peripheral devices are integrated. The gateway controller 360 may further include a payment service processing unit 361 and a membership identification information

processing unit 362.

When the payment service processing unit 361 receives a mobile card payment request message, which includes payment information and membership identification information, from the mobile card payment terminal, it refers to the membership database 341 using the membership identification information and retrieves the payment authorization request server access information and the terminal identification information. The payment service processing unit 361 generates and transmits a payment authorization request message, which includes the inputted payment information and the retrieved terminal identification information, to the corresponding payment authorization request server, receives and transmits the payment authorization information to the mobile card payment terminal.

When the membership identification information processing unit 362 receives the terminal authentication information, which includes the mobile phone subscriber information, from the mobile card payment terminal, it inquires of the mobile phone subscriber information management server 200 whether or not the registered mobile phone subscriber information is valid. If the registered mobile phone

subscriber information is valid, the membership identification information processing unit 362 generates and transmits the membership identification information to the mobile card payment terminal.

In one embodiment, when the membership identification information processing unit 362 receives the mobile card payment terminal identification information and the membership identification information from the mobile card payment terminal, it refers to the membership database 341 using the terminal identification information and retrieves a list of the database in which the terminal identification information is stored. In addition, the membership identification information processing unit 362 stores the membership identification information in the list of the retrieved database. Accordingly, the operator of the mobile card payment service gateway can perform the membership authentication process and, at the same time, automatically store the authenticated membership identification information in the membership database 341.

FIG. 4 is a flow chart of a mobile card payment service according to an embodiment of the present invention.

When the mobile card payment terminal 100 receives a command to select a mobile card payment service menu, it executes a stored mobile card payment program to display a sub-menu which includes, for example, 'pay with a mobile card', 'cancel transaction', 'inquire about transaction status', and 'print receipt'. When the mobile card payment menu is selected from a user, the mobile card payment terminal 100 waits for the mobile card payment information to be input.

When the payment information is input (operation S801), the mobile card payment terminal 100 generates a mobile card payment request message which includes the inputted payment information and the stored membership identification information (operation S802). The payment information includes a card number, the term of validity, the amount of payment, and installment information. The mobile card payment terminal 100 transmits the generated mobile card payment request message to the mobile card payment service gateway 300 (operation S803).

When the mobile card payment service gateway 300 receives the mobile card payment request message, which includes the payment information and the membership identification information, from the mobile

card payment terminal 100, it retrieves the payment authorization request server access information and the terminal identification information, which correspond to the membership identification information (operation S804). After the payment authorization request server access information and the terminal identification information are retrieved, the mobile card payment service gateway 300 generates a payment authorization request message, which includes the retrieved terminal identification information and the payment information inputted from the mobile card payment terminal 100 (operation S805). The mobile card payment service gateway 300 transmits the payment authorization request message to the corresponding payment authorization request server 400 (operation S806).

When the payment authorization request server 400 receives the payment authorization request message, which includes the terminal identification information and the payment information, from the mobile card payment service gateway 300, it transmits the payment authorization request message to the payment authorization server 500 (operation S807). When the payment authorization server 500 receives a card payment authorization request which includes the

payment information and the terminal identification information, it processes a card payment authorization process based on the payment information and the terminal identification information, and transmits the result to the payment authorization request server 400 (operation S808). The mobile card payment service gateway 300 receives the payment authorization information from the payment authorization request server 400 and transmits it to the mobile card payment terminal 100 (operation S809).

FIG. 5 is a flow chart of a membership authentication process for a mobile card payment service.

The mobile card payment terminal 100 applies for admission to membership through a phone call or by fax transfer to an operator of the mobile card payment service gateway 300 (operation S901). An application form preferably includes blanks for entering residence registration number, mobile phone number, payment authorization request server, and the like. Upon admission to membership, the mobile card payment service gateway 300 registers the payment authorization request server access information and the mobile card payment terminal identification information of each payment authorization request

server in the database. Subsequently, the mobile card payment service gateway 300 downloads a mobile card payment program to the mobile card payment terminal 100 (operation S902).

When the mobile card payment program is downloaded to the mobile card payment terminal 100, the mobile card payment terminal 100 operates an authentication module (operation S903), and accesses to the mobile card payment service gateway 300 (operation S904). The mobile card payment terminal 100 transmits the terminal authentication information including mobile phone subscriber information to the mobile card payment service gateway 300 (operation S905). The mobile phone subscriber information may include mobile phone number and at least part of residence registration number. The mobile phone number may be one that is stored in an internal memory or in a SIM card.

When the mobile card payment service gateway 300 receives the terminal authentication information including mobile phone subscriber information from the mobile card payment terminal 100, it inquires of the mobile phone subscriber information management server 200 whether or not the registered mobile phone subscriber information is valid (operation S906).

When the mobile card payment service gateway 300 receives authentication information from the mobile phone subscriber information management server 200, it generates the membership identification information (operation S908) and transmits the membership identification information to the mobile card payment terminal (operation S909).

When the mobile card payment terminal 100 receives the membership identification information from the mobile card payment service gateway 300, it stores the membership identification information in its internal memory or SIM card (operation S910). The mobile card payment terminal 100 transmits the mobile card payment terminal identification information and the membership identification information to the mobile card payment service gateway 300 (operation S911). When the mobile card payment service gateway 300 receives the mobile card payment terminal identification information and the membership identification information from the mobile card payment terminal 100, it refers to the membership database 341 using the terminal identification information, retrieves a list of the database in which the terminal identification information is stored, and stores the membership identification information in

the list of the retrieved database (operation S912).

As apparent from the above description, according to the present invention, the mobile card payment terminal can be operatively connected to a plurality of payment authorization request servers, such as a payment gateway or a server of a VAN service provider, through the mobile card payment service gateway. Accordingly, users of the mobile card payment terminal can conveniently select and change the payment authorization server.

Further, since the mobile card payment terminal is configured to be operatively connected to the mobile phone subscriber information management servers of mobile carriers, it is possible to process mobile phone subscriber authentication for the mobile card payment service and membership authentication of the mobile card payment system at the same time.

While the present invention has been described with reference to exemplary embodiments thereof, it will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the scope of the present invention as defined by the following claims.

What is claimed is:

1. A mobile card payment system including a mobile card payment service gateway that is connected to a mobile card payment terminal over a wireless network and is connected to a payment authorization request server over a leased line or Internet, wherein the mobile card payment terminal comprises:

a wireless communication unit that transmits/receives data to/from a wireless network through an antenna;

a key input unit that allows a user to enter commands and data;

a display unit that displays menus and operating conditions;

a storage unit that stores a mobile card payment program and membership identification information; and

a mobile card payment processing unit that, when a command to select a mobile card payment menu is input from the key input unit, generates and transmits a mobile card payment request message, which includes payment information inputted from the key input unit and the membership identification information stored in the storage unit, to the mobile card payment service gateway through the wireless communication unit under the control of the mobile card payment

program stored in the storage unit,

wherein the mobile card payment service gateway comprises:

a membership database that stores membership identification information, payment authorization request server access information corresponding to the membership identification information, and mobile card payment terminal identification information of each payment authorization request server corresponding to the membership identification information; and

a payment service processing unit that, when a mobile card payment request message including the payment information and the membership identification information is input from the mobile card payment terminal, refers to the membership database using the membership identification information to retrieve the payment authorization request server access information and the terminal identification information, generates and transmits a payment authorization request message, which includes the payment information and the terminal identification information, to a corresponding payment authorization request server after the payment authorization request server access information and the terminal identification information is retrieved, and receives

and transmits the payment authorization information to the mobile card payment terminal.

2. The mobile card payment system of claim 1, wherein the mobile card payment terminal further comprises an authentication processing unit that transmits terminal authentication information including mobile phone subscriber information to the mobile card payment service gateway, receives and stores membership identification information in the storage unit, and

the mobile card payment service gateway further comprises a membership identification information processing unit that, when the terminal authentication information including the mobile phone subscriber information is input from the mobile card payment terminal, inquires of a mobile phone subscriber information management server whether or not the registered mobile phone subscriber information is valid, and, if valid, generates and transmits the membership identification information to the mobile card payment terminal.

3. The mobile card payment system of claim 2, wherein when the mobile card payment terminal

identification information and the membership identification information are input from the mobile card payment terminal, the membership identification information processing unit refers to the membership database using the terminal identification information to retrieve a database list in which the terminal identification information is stored, and stores the membership identification information in the retrieved database list.

4. The mobile card payment system of claim 2, wherein the mobile phone subscriber information includes a mobile phone number and at least part of residence registration number.

5. The mobile card payment system of claim 1, wherein the mobile card payment terminal further comprises a chip interface that interfaces with an external chip card including mobile phone subscriber information, and

the mobile card payment processing unit generates the mobile card payment request message using the mobile phone subscriber information stored in the chip card.

6. The mobile card payment system of claim 1,
wherein the mobile card payment terminal further
comprises:

a communication unit that transmits/receives data
to/from a mobile card reader or a receipt printer; and

a payment authorization information output unit
that outputs the payment authorization information
inputted from the mobile card payment processing unit
to the receipt printer through the communication unit.

7. The mobile card payment system of claim 6,
wherein the communication unit is a short-range
wireless communication unit.

8. The mobile card payment system of claim 1,
wherein the payment information inputted from the key
input unit includes a card number, the term of
validity, the amount of payment, and installment
information.